



**Iascach Intíre Éireann  
Inland Fisheries Ireland**

**Inland Fisheries Ireland  
Crisis Planning – Extreme Flow Events**

## Document Control Sheet

<b>Name of Document:</b>	Crisis Planning – Extreme Flow Events				
<b>Author (s):</b>	Brian Beckett, Director - IFI Dublin				
<b>Authorised Officer:</b>	Dr. Gregory Forde, Head of Operations				
<b>Description of content:</b>	This document outlines an overview of recommendations stemming from the lessons learned following the extended drought experienced in 2018				
<b>Approved by:</b>	Dr. Ciaran Byrne, Chief Executive Officer				
<b>Date of Approval:</b>					
<b>Assigned review period:</b>	As required.				
<b>Date of next review:</b>					
<b>Document Code:</b>	IFI_FLOWCRISIS2019_Rev0.1_2019				
This document comprises	TOC	Text	List of tables	Table of Figures	No. Appendices
		pages			1

## Version Control Table

Version No.	Status	Author (s)	Reviewed By	Approved By	Date of Issue
V. 05	Draft	Brian Beckett	GF		

# Contents

1. Background .....	3
2. Crisis Scenarios and Recommended Measures.....	4

## 1. Background

This document supports IFI's internal risk management / crisis planning process with a particular emphasis on environmental risk and agency response. IFI is committed to learning from experience as climate and other environmental impacts change over time. Building resilience to the current and expected impacts of climate change through adaptation will be challenging. It is crucial however to cope with threats and environmental risk, and to find innovative ways to exploit opportunities where they exist. In doing so, IFI can ensure resilience in the future delivery of its remit. This paper lists possible future environmental crisis scenarios and potential mitigation measures or systems for consideration in response to similar or more extreme conditions into the future. It is hoped that these scenarios can be readily adapted for incorporation into IFI's Crisis Communications Plan.

## 2. Crisis Scenarios and Recommended Measures

### 2.1 Excessive air / water temperatures and reducing water levels and flows for sustained periods

Current Context: Increased air and water temperatures result in reduced water levels and river flows - associated risk increases over the duration of the 'heatwave' period. Efficient and effective management of fish populations (ecologically sensitive biological resource) necessitates the availability of accurate water level, flow, temperature and dissolved oxygen monitoring (as a starting point) at a number of locations (lake and river) nationally. These data must be available in real time or near real-time to allow informed fishery management decisions and to support further scientific research in this area. Currently IFI is reliant on spot measurement by staff on the ground and on third party data (some of which is near real-time) from a variety of sources (EPA, OPW, Local Authorities) which are outside of IFI control in terms of data management / quality etc. The following recommendation relate to 'heat wave' conditions as described in Table 1.

**Table 1: Drought related definitions used in Met Éireann**

DEFINITIONS			
A <b>heat wave</b> occurs where there are 5 consecutive days or more with maximum temperature over 25°C (that is, a daily maximum screen air temperature > 25°C).	A <b>dry spell</b> is a period of 15 or more consecutive days to none of which is credited 1.0mm or more of precipitation (that is daily rainfall < 1.0mm).	A <b>partial drought</b> is a period of at least 29 consecutive days the mean daily rainfall of which does not exceed 0.2mm (that is, a mean for period ≤ 0.2 mm).	An <b>absolute drought</b> is a period of 15 or more consecutive days to none of which is credited 0.2mm or more of precipitation (that is, a daily rainfall total < 0.2mm).

([www.met.ie](http://www.met.ie))

#### Recommendations:

- i) Daily monitoring of ambient water temperature and dissolved oxygen levels in surface waters (prioritise main river channels, key lakes and managed fisheries generally). Limited temperature data are available online from a number of locations nationally under the OPW hydrometric data network [HERE](#) (Linked to IFI's Intranet)
- ii) Daily monitoring of water level and flow data (prioritise main river channels and managed fisheries generally). Flow data are available online from a number of locations nationally under the OPW hydrometric data network [HERE](#) (Linked to IFI's Intranet) and the EPA hydrometric network 'Hydronet' [HERE](#) (Linked to IFI's Intranet).
- iii) Regular interagency communication highlighting any specific fisheries issues with relevant authorities (Irish Water, Local Authorities, EPA, OPW). IFI should regularly revisit communication protocols with IW and other relevant agencies at scheduled meetings. Reliable flow data supports calculation of assimilative capacity 'on the fly' as water levels decrease and critical physico-chemical thresholds are approached or

exceeded. A working group should be convened to address these issues during heatwave conditions.

- iv) Weekly liaison at broader governmental level via membership of the National Directorate Fire and Emergency Management (National Emergency Management Group) Interagency response
- v) During heatwave conditions unauthorised and ad hoc abstractions and associated works (e.g. temporary erection of dams and barriers) will be numerous and will represent a significant risk to water quality, quantity and the inland fisheries resource. This risk will progressively become more acute as the drought period persists. Intervention requires careful consideration based on an assessment of the risk associated with any particular abstraction activity. The limits of fisheries legislation and IFI's statutory powers should be carefully considered prior to any legal intervention.
- vi) Fish Kills should be dealt with according to normal IFI procedures and protocols.
- vii) Reliable temperature, water level and flow data sources and systems (ideally at catchment scale), will support IFI in the definition of temperature and flow threshold(s) on the basis of Green / Amber and Red categorisations to produce a workable and simple solution to the management of angling or other instream activities (e.g. electrofishing, instream works by third parties etc) in real-time (See Appendix A).
- viii) It is proposed that any angling advisory notices issued should be:
  - Applied at RBD and/or catchment level and reviewed regularly (e.g. weekly)
  - Tailored to and be consistent with IFI permit sales on State fisheries etc. (as well as private fisheries)
  - Tailored to and be consistent with IFI communications on angling reports etc. (e.g. great fishing was reported on the Moy whilst national angling advisory was still in effect).

**Table 2: Possible approach to regulation / management of angling activity in response to increasingly warm weather / low flow conditions**

Category	Green	Amber	Red
Flows Rate	>95 percentile plus 15%	>95 percentile and <95 percentile plus 15%	<95 percentile (7 days or more)
Fishery Status	Open	Open with advisory as per 2018	Closed to all angling

- ix) A separate overriding water temperature threshold should be in place which would act in a similar way to the mechanism used in 2018. Developers, planners, scientists and interested groups are subject to specific requirements for fisheries, water and habitat protection, (grounded in the requirements of the Fisheries Acts) when seeking to work in or near waters. IFI issue authorisations to regulate certain ('instream') activities in fishery waters under Sections 14 and 59 ('improvement', 'development') of

the Fisheries Consolidation Act 1959 (as amended). IFI also scientifically assess fish populations under authorisation and on occasion IFI will determine that the best course of action entails removal of fish from one location for transfer to another under authorisation (emergency response, diversion of channels for infrastructural works etc.). Water temperatures experienced in 2018 were deemed to make the practice of fish survey or removal too high risk and so the DCCAIE issued the following note precluding many of these activities. 20 degrees Celsius is regarded as the cut off for such activities.

**Table 3. DCCAIE note (issued July 20<sup>th</sup>, 2018) in respect of S14 activities:**

As we are experiencing extreme weather conditions please adhere to the following. Prior to commencement of any electrofishing survey operations in rivers, lakes and transitional waters, please ensure that the water temperature is checked and recorded; where water temperature is near or exceeds 20 degrees Celsius please cancel the operation. Please also ensure water temperature is sampled and recorded every five minutes during the survey – if temperature approaches 20 degrees Celsius please abandon the survey. While holding fish for sampling please ensure they are kept in the shade in large containers, that water is constantly refreshed and that the water temperature is constantly monitored – no fish should be retained in water approaching 20 degrees Celsius. Also please confine surveys to larger channels with good water flows and deeper sections of lakes.

- x) Information campaigns (including national news bulletins, high profile current affairs / news programmes ) are effective and are likely to reduce the potential for negative impacts (in particular reducing careless discharge of deleterious matter to surface waters and encouraging the careful use of precious water resources). Collaborative and coordinated campaigns with other public authorities (e.g. IFI and IW collaboration on RTE Six One and Nine o'clock News) has been effective to date and should be maximised into the future.

**Table 4. Example of press release issued by IFI during 2018 heatwave:**

IFI reminds landowners, industry and farmers that low water levels and warm water temperatures during the current dry spell puts additional pressures on Ireland's watercourses. Higher water temperatures limit the amount of oxygen in water. Poor quality discharges to rivers and lakes, e.g. silage effluent or sewage discharges can put additional demands on the already depleted oxygen levels in water at this time and can result in pollution incidents and fish kills. Landowners are also reminded that abstraction of water from rivers and lakes should only be carried out in a sustainable manner to ensure sufficient levels are available for other water users and to protect the aquatic habitat.

## 2.2 Periods of Flooding

Current Context: Of the two issues (severe flooding or prolonged drought) flooding is typically far less harmful to fish and fish habitat in terms of direct impact on fish stocks. Fish are well adapted to tolerate spates/flooding, elevated sediment loading and for seeking refuge areas out of high velocity flows. Potential impact of flooding on fish stocks very often relate to inappropriate, disproportionate and poorly constructed flood alleviation measures undertaken as part of the human response to extreme flood events. These works, particularly if they are carried out during the wrong time of year and in the absence of an appropriate work method statement, can be much more detrimental to fish stocks and habitat than the actual flood event itself.

### Recommendations:

- i) Communication between landowners, local authorities and the competent fisheries authority is essential to inform appropriate flood remedial measures.
- ii) IFI works positively with Government Departments, State Agencies, Local Authorities, groups and individuals in relation to the broad issue of surface waters maintenance and channel conveyance throughout Ireland. IFI are precluded under fisheries legislation from approving in-stream works (i.e. works in water) during certain sensitive periods annually which primarily relate to fish spawning activity. There are significant variations in the timing and duration of salmonid (Salmon and Trout) spawning activity throughout the Republic of Ireland. To minimise adverse impacts on the fisheries resource, works in rivers, streams, watercourses, lakes, reservoirs and ponds should (except in exceptional circumstances discussed below) be carried out during the period July 1st to September 30th.
- iii) Severe/extreme flood events (which are becoming more frequent) can cause extensive damage to housing and critical infrastructural which may require urgent response to rectify. Whilst Local Authorities have legislation to conduct such emergency works these remedial works must ensure free fish passage, minimise impact to fish stocks and whenever possible be carried out at the appropriate time of year. When this is not possible the Local Authority may apply for an 'exemption' to conduct essential works during the close season. Temporary civil works may be required, but should be carried out to minimise impact on fish and to ensure free passage until replaced by permanent infrastructure. Early and frequent communication, together with site inspections, is again a primary requirement.
- iv) IFI issues a reminder to Local Authorities that all programmed works in-stream need to be fully completed by September 30<sup>th</sup> annually. It is important to highlight that this communication is issued only in the context of Inland Fisheries Ireland's legislative responsibilities (there may be other agencies where sanction or approval are also required for this type of work e.g. OPW, NPWS etc).



- v) Exceptional Emergency Circumstances - once the September 30th deadline has passed in exceptional emergency circumstances requiring relief from flooding, landslide and subsidence (as defined in the Local Authorities Works Act, 1949) and relating to human safety, in-stream works by Local Authorities 'out of season' may be permitted (subject to strict conditions) by the Department of Communications, Climate Action and Environment. In this scenario it must be shown to the Department's satisfaction that the relevant Local Authority is taking 'all precautions and making such provisions for the protection of fisheries as the Minister either generally or in a particular case may advise'. This would not include for example major (multi-annual) planned drainage schemes but does include, for example, emergency works for the immediate alleviation of flooding; which may address an issue for a period until the appropriate season for in-stream construction works in certain surface waters.
- vi) It should be noted that the Local Authority (Works) Act, 1949 was enacted in the absence of much of today's raft of national and European environmental legislation. The wording of the Act is very specific and addresses a provision whereby in exceptional circumstances the authority can be exempted from the provision of the Fisheries Acts (as permitted by the Department of Communications, Climate Action and Environment). It must be highlighted that notwithstanding the provisions of this legislation, it is the responsibility of the relevant authority to establish their responsibilities under all relevant legislation when considering in-stream emergency or other work programmes in order to ascertain their level of legislative compliance beyond the narrow scope addressed in the Local Authority (Works) Act 1949.
- vii) IFI have very limited powers in relation to unauthorised or ill-advised flood protection, bank erosion or drainage works. Best practice guidelines and the EAP process may apply for IFI funded projects, but IFI have limited statutory powers to prevent most inappropriate, unauthorised or ill-conceived drainage, gravel extraction or other instream works. The limits of fisheries legislation and IFI's statutory powers should be carefully considered prior to any legal intervention.

## APPENDIX A

### A BASIC APPROACH TO MINIMUM ACCEPTABLE FLOW CATEGORIES

(Recommended for further consideration and refinement with experts in the field of hydrology / hydromorphology and aquatic ecology)

<p><b>The Green Zone</b></p> <ul style="list-style-type: none"> <li>would be all flow rates above the 75 percentile rate (flow rate equalled or exceeded 75 percent of the time).</li> </ul>	<p><b>Safe zone</b></p> <ul style="list-style-type: none"> <li>no management intervention required.</li> </ul>
<p><b>The Amber Zone</b></p> <ul style="list-style-type: none"> <li>would be represented by the range of flows between the 95 percentile flow and the 75 percentile flow - this would require further clarification from existing data sets.</li> <li>A mean water temperature between 15 and 19 Degrees Celsius during daylight hours</li> </ul>	<p><b>Caution advised</b></p> <ul style="list-style-type: none"> <li>possible management intervention required.</li> </ul>
<p><b>The Red Zone</b></p> <ul style="list-style-type: none"> <li>would have an upper flow limit defined by the Dry Weather Flow or 95 percentile flow (whichever is higher) and would be based on reliable real-time or near real-time data streaming from a system developed in conjunction with relevant bodies including the OPW/EPA/Local Authority.</li> <li>flow level sustained for 7 consecutive days or more.</li> <li>would also be defined by a mean water temperature of 20 degrees Celsius or more during daylight hours.</li> </ul>	<p><b>Intervention</b></p> <ul style="list-style-type: none"> <li>these thresholds would serve to delineate the flow conditions below which and temperature conditions above which angling and any other instream works such as electrofishing and development activity would generally cease on a fishery.</li> </ul>

## Appendix B - Summary of Learnings from the 2018 Drought and associated Recommendations

	Learning	Recommendations
<b>Water temp. / physico-chemistry</b>	Primary reliance on field staff ad hoc measurement and in the case of 3 <sup>rd</sup> party data sources - unspecified data accuracy, quality control, no influence over location of measurement.	<ul style="list-style-type: none"> <li>• Enhanced coordination through formation of IFI (and interagency?) working group.</li> <li>• Explore options for IFI network based on IOT technology.</li> <li>• Identify projects &amp; actions based on data requirements across all locations.</li> <li>• Assess and set thresholds across all locations.</li> <li>• Develop final reliable, effective data network.</li> </ul>
<b>WWTPs and assimilative capacity</b>	<b>Good communication systems with other public authorities however challenges were experienced relating to the relatively static regulatory system in place when attempting to respond to dynamic assimilative capacity changes.</b>	<ul style="list-style-type: none"> <li>• <b>Enhanced coordination through formation of IFI (and interagency?) working group.</b></li> <li>• <b>Explore options for IFI data network based on IOT technology.</b></li> <li>• <b>Identify projects &amp; actions based on data requirements across all locations.</b></li> <li>• <b>Assess and set thresholds across all locations.</b></li> <li>• <b>Develop final reliable, effective data network.</b></li> </ul>
<b>Surface Water Levels and River Flow Data</b>	<ul style="list-style-type: none"> <li>• IFI is reliant on third party data (the majority of which is near real-time) from a variety of sources (EPA, OPW, Local Authorities) which are outside of IFI control in terms of data management / quality etc. While this data was broadly very useful it is apparent that management of fish populations at certain resolutions (e.g. at catchment level) may require additional water level and flow data in real-time.</li> <li>• IFI role in both pro-active and reactive promotion and regulation of sustainable development is increasingly important as pressures in these areas become more</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced coordination through formation of IFI (and interagency including Irish Water, EPA, OPW and Local Authorities) working group.</li> <li>• Explore options for IFI data network based on IOT technology.</li> <li>• Identify projects &amp; actions based on data requirements across all locations.</li> <li>• Assess and set thresholds across all locations.</li> <li>• Develop final reliable, effective data network.</li> </ul>

	<b>Learning</b>	<b>Recommendations</b>
	<p>acute with climate impacts – riparian zone land management, drainage design, infrastructural development, flood alleviation etc.</p>	
<b>Abstractions</b>	<ul style="list-style-type: none"> <li>• <b>Unauthorised and ad hoc abstractions and associated works (e.g. temporary erection of dams and barriers) were numerous and were regarded as a significant risk to water quality, quantity and the inland fisheries resource.</b></li> <li>• <b>IFI role in both pro-active and reactive promotion and regulation of sustainable development is increasingly important as pressures in these areas become more acute with climate impacts.</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Work with DCCAE on legislative review to address current and future identified deficiencies in fisheries legislation to address these risks in a more comprehensive and effective way at the level of aquatic biological resource management.</b></li> <li>• <b>Develop ‘ready to go’ legislative provisions to address critical risks which may arise from time to time.</b></li> </ul>
<b>Fish Kills</b>	<ul style="list-style-type: none"> <li>• Overall recorded mortality rate was lower than might have been anticipated.</li> <li>• The likelihood of significantly depressed survival and recruitment during summer 2018 should be noted.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantifying the impact of conditions experienced during 2018 on recruitment and survival of fish populations and on the development of mitigation measures and best practice recommendations to inform fisheries policy and management into the future is critical.</li> <li>• Consideration of various mechanisms of mortality e.g. absence of water, diversion of water, water temperature, vulnerability to predation, reduced functional habitat, reduction in assimilative capacity, increased overall ecological pressure.</li> </ul>
<b>Regulatory response to 2018 conditions (angling /</b>	<ul style="list-style-type: none"> <li>• <b>A ‘one size fits all’ approach is limited in applicability.</b></li> <li>• <b>Higher resolution management regime (e.g. assessment and intervention by</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Develop a suite of simple and workable threshold values for temperature, flow and or water level in regulation or policy to support management decisions.</b></li> <li>• <b>Sustained development of best practice guidance material to</b></li> </ul>

	Learning	Recommendations
instream activity)	<p>catchment) may be more appropriate.</p> <ul style="list-style-type: none"> <li>• A temperature cut-off appeared to be relatively effective in activity management.</li> </ul>	<p>support sustainable planning and development that may impact on the fisheries resource.</p> <ul style="list-style-type: none"> <li>• IFI have very limited powers in relation to unauthorised or ill-advised flood protection, bank erosion or drainage works. Best practice guidelines and the EAP process may apply for IFI funded projects, but IFI have insufficient statutory powers to prevent most inappropriate, un-authorised or ill-conceived drainage, gravel extraction or other instream works. This should be a critical area for legislative amendment in the current re-drafting of IFI legislation and statutory powers.</li> </ul>
<b>Communications and PR</b>	<p>Information campaigns were likely to have reduced the potential for negative impacts. Incremental communications were considered effective over the period.</p>	<ul style="list-style-type: none"> <li>• More of the same under similar circumstances.</li> <li>• Collaborative and coordinated campaigns with other public authorities appeared to be most effective and should be maximised into the future.</li> </ul>
<b>Barriers to fish migration</b>	<ul style="list-style-type: none"> <li>• Conventional wisdom dictates that salmon and sea trout migrate only during medium to high flows. This is not always the case - IFI fish salvage operations at Clohamon (well over 20km upstream from the tidal part of the Slaney) under very low flow conditions have highlighted this, with a significant proportion of the salmon and sea trout encountered during the salvage operations being silver and with fresh sea lice marks. Large numbers of sea trout ran the Slaney at Clohamon under close to historic low flows in 2018. Barriers that might not normally represent a significant impediment will prevent fish migration for a significant length of time.</li> </ul>	<ul style="list-style-type: none"> <li>• All barriers/weirs should be passable to all age classes of all fish species at all times. Future likely impacts of climate change highlight the need for concerted and immediate action. Research, policy, guidance, implementation required.</li> <li>• Review barriers at counter sites during drought conditions.</li> <li>• Rapid response required on unauthorised ad hoc barriers put in place for commercial water abstraction.</li> </ul>

---

## Learning

- Sectoral Policy - Climate change has been identified by Inland Fisheries Ireland (IFI) as one of the greatest threats facing the wider aquatic environment and fish populations and structure in the medium to long term. Considerable uncertainties and research gaps remain in relation to the impacts of climate change on Irish fish species, populations and habitats.
- IFI role in both pro-active and reactive promotion and regulation of sustainable development is increasingly important as pressures in these areas become more acute with climate impacts – riparian zone land management, drainage design, infrastructural development, flood alleviation etc.

## Recommendations

- IFI aims to build an evidence-based assessment programme to assess the impact of climate change on the Irish fisheries sector in both freshwater and estuarine environments, with the ultimate aim being to inform and build capacity for fisheries conservation and protection measures (adaptation and mitigation strategies).
- Fisheries riparian management measures – research and policy formulation required e.g. need to get appropriate riparian balance of shading without tunnelling - species appropriate - opportunity to develop updated guidance (develop on some advice already issued by IFI on various land use issues / development).
- Land use / flooding Fisheries management measures - research and policy formulation to support sustainable planning...room for river to flood for sediment transport and natural gravel cleaning/silt removal, 're-wilding' of upland areas to help increase water absorption and reduce the speed at which water enters our rivers (may not have a an effect in large rain events).
- Play role in promotion of public awareness of the benefits/role of natural rivers in flood prevention with all associated biodiversity benefits.

**END**