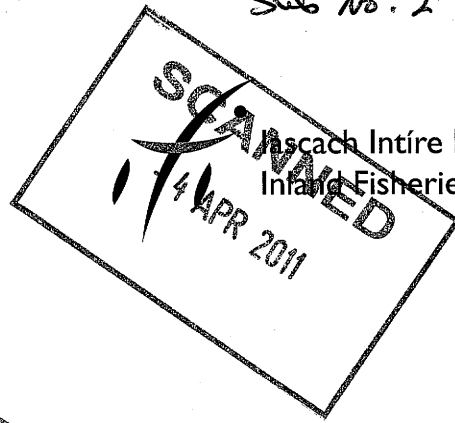


Sub No. 2

Ascach Intíre Éireann
Inland Fisheries Ireland



Dr. Karen Creed,
DAS Licensing,
EPA.
Johnstown Castle,
Wexford,
Co. Wexford.
25.3.2011.

Re: Lower R. Suir – Waterford Harbour: Habitats Directive Annex II fish species and dredging –requests from Port of Waterford and Waterford Corporation

Dear Karen,

In response to your recent communications in regard to the above, I have examined the closed period, the documentation submitted by Port of Waterford and the recent DAS application from Waterford Corporation. I have also reviewed the situation with my colleagues in Inland Fisheries Ireland Southeastern RBD based in Clonmel. Their views concur with mine as expressed below. In particular they have expressed reservations in regard to any dredging operation that disperses sediments as opposed to dredging that accumulates material for dumping at a specified dump site.

The freshwater and tidal reaches of the Barrow, Nore and Suir and Waterford Harbour are designated as Special Areas of Conservation or SACs under the EU Habitats Directive. Among the range of qualifying interests are a series of fish including Atlantic salmon (in freshwater habitats only), sea-, river- and brook lamprey and Twaité shad. In addition, the smelt, listed in the Irish Red Data Book for Vertebrates, has significant populations in these waters. While the National Parks and Wildlife Service (NPWS) has a national role in regard to issues dealing with SACs, the Minister for Communications, Energy and Natural Resources has an important role in regard to the fish species, as indicated in the Irish implementing legislation (S.I. 94 of 1997). In this context, IFI (previously the Central and Regional Fisheries Boards) undertakes a monitoring and conservation role on behalf of the Minister.

The suite of fish species listed above all avail of the waters of Waterford Harbour, the transitional waters (or estuaries) of the Barrow – Nore- Suir and the freshwater reaches of these three rivers to different degrees (Table 1). Different life stages of the species engage in passage through the transitional waters and Waterford Harbour at different times of year. In view of this, it is clear that actions occurring in these waters that might impact on fish passage or other life stages should be seriously examined as to their

appropriateness in the context of the conservation objectives of these Special Areas of Conservation.

It is against this background of significant fish transit, residency and overall usage of these waters that an 'environmental window' was introduced into licence conditions for dredging in 2002. The constraint introduced by this window was considered appropriate in the context of the Precautionary Principle. Equally, there was recognition of the commercial and social importance of the port and shipping activities associated with Port of Waterford's activities at Belview.

Table 1. Fish species use of Waterford Harbour and inflowing estuaries

Species	Life stage	Use of water	Location	Time of year	Status
Atlantic salmon	adult	u/s migration	Complete transit	all months	Habitats Directive & Red Data Book
	smolt	d/s migration	Complete transit	March - May	
Sea lamprey	adult	u/s migration	Complete transit	March - May	Habitats Directive & Red Data Book
	young adult	d/s migration	Complete transit	autumn - winter	
River lamprey	adult	u/s migration	Complete transit	autumn winter	Habitats Directive & Red Data Book
	young adult	d/s migration	Complete transit	autumn winter	
Brook lamprey	N.A.	N.A.	N.A.	N.A.	Habitats Directive & Red Data Book
Twaité shad	adult	u/s migration	upper tidal limit	March - May	Habitats Directive & Red Data Book
		residency	lower estuary	May - March	
	eggs/larvae	tidal transport	upper tidal zone	May - July	
	0+ and 1+ fish	resident	mid-lower estuary	all-round	
Smelt	adult	u/s migration	upper tidal limit	February - April	Red Data Book
	0+	resident	mid-lower estuary	mid-lower estuary	
	1+ and older	resident	mid-lower estuary	mid-lower estuary	

Dredging in estuaries may be necessitated to counteract natural processes of erosion and deposition, both being operated on by uni-directional freshwater flow and two-directional tidal flow. In terms of channel management and port functioning, dredging is seen as a necessity to maintain safe passage for shipping in fairways and at berthages. In biological terms, dredging is disruptive of the channel bed, completely disturbing its physical form and ecology by removing or destroying habitats and the species resident within or on the dredged area.

Two issues now presenting require an examination of the current 'closed season' or environmental window for dredging in Waterford Harbour and its influent waters

1. Request by Port of Waterford to have closed season reduced or eliminated in context of renewal / review of its maintenance dredging licence
2. Application by Waterford Corporation for licence to plough dredge and dredge out areas of deposition in preparation for arrival of Tall Ships event in 2011

Port of Waterford (POW) – renewal / review of maintenance dredging licence and request for modification of the closed season:

POW and its fisheries consultant had a meeting with members of the Marine Licence Vetting Committee (MLVC) in June 2009 to examine this issue. The closed season was discussed in the light of the biology and ecology of the various species listed in Table 1. POW gave a detailed description of the functioning of the suction dredging process being proposed, in the context of easement of the environmental stricture. This identified that the suction head was actually buried into the upper layers of the channel bed where it was suctioning. The suctioning process drew the required bed material into a network of tubing and, ultimately, into the hull of a barge. This process facilitated a situation where disturbance of silt and its entrainment or dispersal into the water column would be confined due to the localised action and the placement of the suction head.

The MLVC members identified that POW should develop a document in which it (POW) should draw together casework dealing with

- Archival data from Waterford dealing with high natural or background SS levels in that water
- suspended solids release from dredging operations;
- waters in which Annex II species were considered to experience exposure to high suspended solids (the Severn was suggested as an example)

MLVC considered that a document supported strongly by case studies might support the POW case.

POW submitted an initial document in November 2009 with revisions in March 2010.

During this period, new legislation had been introduced that impacted on the previous Foreshore legislation and, hence, on the role of the MLVC. Up to this the MLVC had dealt with

1. Permits to carry out actions on the foreshore
2. Dumping at sea (DAS) applications

Within the latter, a permit to dump had an implied permission to dredge, this latter being included in the dumping permit. Both foreshore licensing and DAS had been dealt with by DCENR. These functions were then transferred to DAFF. The new legislation split the functions, with foreshore licensing going to DEHLG, dredging in commercial fishing harbours remaining with DAFF and DAS applications being transferred to the EPA. Areas of jurisdiction and overlap continue to be an issue. The MLVC was formalised within DEHLG. Members of MLVC, among others, were also invited to sit on the DAS advisory group established by the EPA. A complication with the DAS function within EPA arose in regard to when and where the 'dumping' process actually commenced. While EPA was permitted to grant permits to 'dump' there was no clarity as to who could grant permits to 'dredge', creating a need to 'dump'. It was problematic to address and advance the case being made by POW in regard to closed periods etc in the climate of uncertainty over status of MLVC, allocation of control for dumping etc.

Waterford Corporation dredging request in context of maintenance programme and arrival of the Tall Ships Race on 30th June 2011:

There are clear parallels between the two maintenance dredging applications, in regard to actions that might take place within a SAC that might impact on the conservation status of the qualifying interests, the Annex II-listed fish on this occasion.

The Waterford Corporation application lays out the proposed methods of work and identifies issues in regard to the time line constraints in regard to the ecological window applying to POW and the dredge depths required for the Tall Ships event.

All of the documentation in respect of this application is available on the EPA website, under 'DAS permits'.

Waterford Corporation wishes to dredge down to achieve an O.D. level suitable for berthing of vessels. The material to be removed consists of fine grades of sands and silts. The proposal is to use a mix of plough dredging and back hoe dredging. The former essentially disturbs and disperses the bed material, using tidal forces to remove the entrained material away from the dig site. The latter excavates the bed material using an excavating bucket for loading into a barge for marine disposal at a designated dump site off Hook Head.

Documentation supplied by Waterford Corporation appears to indicate that almost all material for dredging lies on the inner or quay side of the existing series of pontoon moorings. This is shown as a sloped area of deposition in cross-sections, with very little by way of intrusion into the outer berthing areas, except under the pontoon fronting Reginald's Tower.

The plough dredging would disperse the problem i.e removal of deposits from the mooring areas with no certainty as to where the dispersed material would settle out. The plough dredging, by the nature of the operation, would generate elevated suspended

solids levels in the water column and these elevated levels would be dispersed across the channel. This process would be continuous as long as the plough dredge was in operation. On the other hand, the proposed back hoe would remove sediment by bucket into the hull of a barge for marine disposal.

Thus there are two issues with the Waterford Corporation application:

- Timing of works, both in regard to existing window and to programming as close as possible to the Tall Ships event
- Method of dredging and potential impacts, particularly in regard to generation of Suspended Solids loadings

Considerations for IFI in regard to these applications:

The environmental window currently in place was developed under the Precautionary Principle with the aim of maximising protection of life stages of selected fish species from adverse impacts of suspended solids – measured as suspended solids (SS) or as turbidity (in NTU units). The months of March, April, May and June are those in which the greatest degree of movement of life stages of the listed fish species occurs. Adults of sea lamprey, of Twaite shad and of smelt ascend to spawning grounds while the smolt stage of Atlantic salmon descends.

The general fisheries concern is that elevated Suspended Solids (SS) levels may impact adversely on fish. This may be mediated through fine particulate material coating onto or inside gills, leading to abrasions and infection, and / or preventing or obstructing gas exchange; deposition of fines onto areas where egg deposition has occurred; possible creation of water conditions that would impede swimming or 'obstruct' passage, either alone or in synergy with reduced oxygen or other conditions.

A report for POW by Delft Hydraulics presented measured data on SS levels generated in dredging operations in Waterford Harbour. Maximum values of SS ranged from 50 – 500 mg/l. The impacts of dredging, based on modelling, indicated an increase in SS of up to 100 mg/l in the immediate vicinity of the dredger but this value fell away substantially at a distance of 500 m from the dredge site.

Studies in the Loire (Sauriau et al 1993) have implicated a convergence of high turbidity, contributing to anoxic conditions, with mortality of adult mullet in their seaward migration from the estuary.

Auld and Schubel (1978) reported significant reduction in survival of American shad larvae (*Alosa sapidissima*) exposed to 100 mg/l of SS in laboratory conditions for 96 hours.

Wilber and Clarke (2001) have reviewed the impacts of SS on fish in estuaries in relation to dredging and concluded that there was a paucity of field-based data on impacts, the majority of information coming from laboratory-based bioassay studies. These authors reviewed both mechanical and hydraulic dredging. The former can generate large SS loadings to the water column through the digging process, losses to the water on lifting of bucket and losses in loading to a barge. By way of example, the authors indicate that sediment plume of high SS level of 1100 mg/l may extend for a distance of 1,000 m along the bottom in a mechanical dredge operation. Hydraulic dredging mixes large volumes of water with the sediment and pumps the slurry up into a reception barge. SS values at the site of dredging on the bed generally remain below 500 mg/l and plumes are limited to less than 500 m in length. However, if the slurry is allowed to overflow from the reception barges, a practise designed to increase the volume of solids the barge can transport, then significant SS release into the surface waters will occur, leading to elevated SS levels at bed level and water surface level.

Wilber and Clarke (2001) point to the wide variety of responses of specified fish species to SS levels – with “no effect” for two species exposed to concentrations of 14, 000 mg/l for 3 days, on the one hand, and mortality of another at 580 mg/l for 1 day. These findings point to the need for information in relation to unique species responses. In the absence of such information, it is not inappropriate to implement a precautionary approach to safeguard particular life stages considered vulnerable.

High SS values are a feature of the Severn estuary, which is traversed by large populations of Twaite shad including upstream migrating adults and downstream migrating young-of-the-year. The Gironde is a large French estuary which can carry very high SS levels. It too is a migration route for large populations of shad. Large mortalities of shad occurred in 2003 in the Gironde, attributed to drought level flows in incoming channels (M. Lepage pers comm.). The low level of inflows may have exacerbated turbidity conditions in the estuary that may, in turn, have contributed to an adverse condition in the water body for the shad, as with the mullet studies in the Loire (see Sauriau above).

In the context of the Water Framework Directive (WFD) France has proposed a series of range values for physical / chemical variables in estuaries for the categories of High – Good – Moderate – Poor and Bad. In regard to Turbidity (correlate with SS) a range of 50 – 500 NTU (equating to approx 100 – 1000 mg/l SS) is proposed for the 'Moderate' category of estuaries (Taverny et al 2009). The WFD requires that waters attain the status of at least 'Good' by 2015. The French criteria for the 'Good' category, for Turbidity, indicate that values should be less than or equal to 50 NTU (approx 100 mg/l SS). This guide figure should be borne in mind in assessing dredging impacts and other developments within the Waterford Harbour waters i.e. requirements of both WFD and of Habitats Directive require to be borne in mind. Ireland is a member state of the EU and has signed up to implementation of WFD.

Use of the French criterion for 'Good' turbidity (SS) status in estuaries would indicate that, under natural conditions, Waterford Harbour would be likely to exceed, frequently,

this guidance and fall to 'Moderate' status. Anthropogenic actions, such as dredging, would be likely to increase SS levels, both in the immediate area and, to a lesser degree, in a surrounding radius from the dredge site.

The two cases to hand and possible options available to facilitate concerns of all parties:

POW and 'closed period' –

- Closed period is intended to reduce adverse pressures to up- and downstream migration of specific life stages of particular fish species (Annex II and Red Data Book)
- No demonstrated impacts (physiological, behavioural, ecological etc) of high SS levels on the life stages of the target species being protected by the current closed period
- No demonstrated absence of impact of high SS
- Proposed dredging to be via hydraulic suction method
- Proposed dredging to be in specific locations, only, as opposed to extending over wide areas of the waterbody
- Likelihood of adverse impact may be less at the Duncannon Bar site compared to dredging at the Cheekpoint Bars or at Belview terminal area due to larger volume of water and greater 3 –dimensional space to facilitate avoidance reaction by fish
- Shad may be resident throughout the Waterford Harbour water body over the 12-month period. Some fish may not require to traverse Duncannon Bar area during dredging, in order to ascend to spawning areas in the Suir – Nore-Barrow
- The same point would apply to smelt
- Suction dredging should, largely, confine high SS levels to the bed and lower part of the water column
- Permitting barges to overflow during loading from the suction dredge allows potentially high SS levels to enter the surface and, hence, remaining part of the water column
- Controlling the release of overflow from barges would reduce adverse impact of SS release to water surface. This could be done via managing the degree of 'slurrification' of the bed material, rate of pumping of slurry into the barge and the degree and rate of overflow
- Removal of closed period in respect of dredging at Duncannon Bar may not adversely impact on movements of the fish species currently protected by the present arrangement
- Retention of the closed period in respect of dredging in the vicinity of the confluence of the Suir and Barrow, or in areas of these estuaries upstream of Cheekpoint may serve a valuable role in reducing potential adverse impacts to the migrating fish

- Monitoring of SS (or surrogate Turbidity) in surface waters adjoining the reception barge during dredging would provide information on overflow, which should, itself, be controlled, and its impact on SS
- The closed period should be subject to regular review if/as new information comes to hand via international review/ journal articles or via studies on status of the target species in the waters concerned

Waterford Corporation maintenance dredging (to facilitate Tall Ships event) –

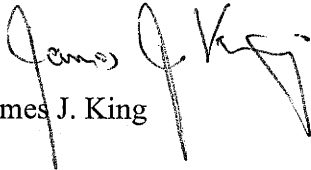
- Closed period is intended to reduce adverse pressures to up- and downstream migration of specific life stages of particular fish species (Annex II and Red Data Book)
- No demonstrated impacts (physiological, behavioural, ecological etc) of high SS levels on the life stages of the target species being protected by the current closed period
- No demonstrated absence of impact of high SS
- Dredging proposal would involve mechanical method and plough dredging, principally the latter
- Area of operation is more confined than those of POW, with an attendant greater likelihood of greater concentrations of SS with potential for greater adverse impact
- Mechanical dredging would remove the problem deposits completely from the habitats
- Given the very shallow-water nature of the works sites, inside the existing pontoons, mechanical dredging would achieve major clearance with minimal losses of SS to the water column and minimal quantities of water occupying the dumping barges
- Working at low tide, it may be an option to dredge 'in the dry' with terrestrially-based plant working from the quay or from the sand bars to load trucks for dumping to landfill sites or for some beneficial purpose (given the high levels of silt and fine sands and low levels of contamination)
- Plough dredging merely disperses the material to be removed and relies on river flow and tidal movements to disperse the plume of material created in the dredging process. This process has potential to generate very high SS levels on a continuous basis during the course of the operation. This will occur initially in the immediate works area, which is confined to a narrow portion of the overall river cross-section in Waterford city. However, the continuous nature of the disturbance and dispersal may give rise to substantial SS levels across the entire cross-section. This in turn will form a large plume moving up-and downstream with tide
- There are strong economic and social imperatives to facilitate complete success of the Tall Ships event

- Environmental issues relating to fish passage and the closed season, as it applies to POW, may all be facilitated in the case of Waterford Corporation's application via 1) completion of all dredging via mechanical dredging and minimal or zero use of plough dredge and 2) undertaking of dredging in June, leading up to the event
- The easement of the closed period in respect of June is based on the following a) adult shad have, in the main, ascended through the critical zone at Waterford city during late April and May, b) adult sea lamprey can be seen excavating nests or redds in late May in Clonmel, indicating that a portion, at least, of the sea lamprey population of the R. Suir has passed Waterford by the start of June, c) adult smelt have descended past Waterford to the lower Harbour by late May, d) larval shad and young-of-year of smelt will still be in the upper estuary of the Suir during June
- The smolt run of Atlantic salmon may not be concluded by end May. However, it is considered that a substantial portion will have passed during the March – May period. In addition, if mechanical dredging, only, is undertaken the plume of SS that may be associated with it will be much reduced compared to any from plough dredging

I trust that this is of assistance to you in developing the EPA's response to the relevant applications.

Yours sincerely,

James J. King



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