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Post-Trial Dredge Report Hot-water Section Lanesborough August 2015



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1. Scope of Report

This report was produced for the agencies as part of the actions agreed arising from the confirmation of the presence of the highly invasive Asian Clam in the hotwater stretch at Lanesborough, Co. Longford. It details the work undertaken to re-open the fishery to angling, the completion and results of the trial dredge operation, the disposal options pursued, biosecurity recommendations for Lough Ree and the management opinions.

2. Introduction

2.1 Asian Clam at Lanesborough

In September 2014 a large population of Asian Clam was located in the hotwater section of the River Shannon, below the hot water discharge from the ESB electricity generating station at Lanesborough. Initial observations revealed large numbers of live Asian Clams inhabiting the coarse substrate in this shallow (to 2 metres) and warm water habitat. As a consequence of the threat that an infestation of Asian clam might have on angling and tourism in general to this mid-Shannon area, IFI temporarily closed the fishery at the hotwater stretch in Lanesborough. Signage was also erected which alerted anglers and others of the presence of this invasive organism.

Angling in Ireland is worth €755 million per annum and up to 10,000 job equivalents (*IFI*, 2013). The threat posed by Asian Clam populations to angling, resident fish and the aquatic habitat is recognised (*Caffrey et al, 2011*) and necessitated this rapid response and assessment. A multi-agency approach was seen as the most inclusive way forward to develop a strategy to assess the extent of the infestation and identify the options for the future. Following a number of meetings convened by IFI with local angling interests, community groups and relevant agencies (ESB, Waterways Ireland, OPW, Bord Na Mona, NPWS, Local Authorities), it was agreed that no further action could be taken until a detailed scientific survey was undertaken by IFI.



Inland Fisheries Ireland carried out a scientific survey to determine the status (presence or absence and relative abundance) of Asian Clam populations. The survey focused on the mid-Shannon area, from Termonbarry (10km upstream of Lanesborough-Ballyleague) to the mouth of Lough Ree and in the immediate vicinity of Lanesborough-Ballyleague.

A report (*Status of Asian Clam in the mid-River Shannon and recommendations for its management, IFI October 2014*) was published and discussed by the relevant agencies and local stakeholders. The next steps agreed were the installation of disinfection arrangements to facilitate the re-opening of the fishery and a trial dredge operation to ascertain whether management measures could be effective in controlling the infestation.

2.2 Trial Objectives

The trial dredge operation would be carried out in a specified 15 metre squared marked area downstream of the bridge, within the hotwater stretch with a view to assessing the suitability of the suction dredging method to remove the Asian clams from the river bed to a dump truck for removal off-site to a suitable biosecure location. In preparation for the trial dredge a relevant appropriate assessment screening report would be carried out, the disposal material would be analysed for waste categorisation and a suitable site or method for disposal would be determined. This would lay the groundwork for assessing whether a potential large scale operation could be carried out should it be deemed a necessary requirement.

3. Trial Method

3.1 Trial Area

The proposed trial site is within the Lough Ree proposed Natural Heritage Area (Pnha), Special Area of Conservation (SAC – Site code 000440) as well as the Lough Ree Special Protection Area (SPA – Site code 004064). Waterways Ireland prepared an Appropriate Assessment Screening Report for the trial dredge at this site in conjunction with IFI and NPWS.



The specified trial area agreed was downstream of the Lanesborough/Ballyleague vehicle bridge and the extent of it was marked on the bankside. Samples of the material from the bed of the river were taken at various locations to obtain a categorisation for waste disposal (Appendix II).

3.2 Trial Operation

The trial operation could not commence until June 2015 due to the water levels and flows experienced from December 2014 to May 2015. Two attempts were made to install the necessary silt curtain earlier in the year but these were unsuccessful. The trial was carried out by Waterways Ireland, who have the necessary expertise and equipment to safely carry out such works and the operation was funded by Inland Fisheries Ireland.

The method proposed was to suction dredge the clams at the location shown hatched in red in Figure 1. A silt screen (Geotextile curtain) was placed around the area. The screen was weighted on the bed of the river by re-bars attached to the screen and was buoyant on the surface of the water. The individual units of the silt curtain were overlapped and stitched together with cable ties. The Watermaster dredger (Figure 2) operated inside the silt curtain. The Watermaster dredger consists of a cutter head attached to a hydraulic arm that rotates on the bed of the river. The dredger is retained in position by spud legs that are attached to the dredger and hydraulically sunk into the river bed. From the cutter head the material is pumped through a flexible pipe system to a discharge point, in this case a skip that allowed the settlement and retention of the dredged material but also allowed the water to drain away.

The skip was placed on a set of pontoons overlapping the silt curtain (Figure 3) and any residual liquid returned directly inside the silt curtain area. The operation took 2 days to set up and 1 day operating in the area.

A sample of the waste material was submitted to a co-incineration plant to test the viability of this method of disposal.

IFI electro-fished the area before the commencement of works to remove fish from the dredging area prior to the placement of the silt curtain.





Figure 1: Trial Area downstream of Lanesborough Bridge marked in red.





Figure 2: Watermaster suction dredge machinery used during the trial.



Figure 3: Skip placement on pontoons within the silt curtain area for discharge.



3.3 Trial Output and Results

Waterways Ireland reported a number of issues that arose during the course of the dredging which would need to be addressed prior to any future dredging operations.

In the event that full suction dredging was to be considered, Waterways Ireland (WI) has recommended the following improvements to the equipment used:

- The cutting head of the suction dredger would require alterations to reduce the stone and pebble content of the samples. The bars at the cutting head are currently spaced at 40mm and WI would reduce this to 30mm. The suction area at the cutting head is currently set at 180 degrees and to improve suction WI would amend this area to 360 degrees. This could improve the efficiency of dredging this type of material and reduce the costs.
- 2) The holding tank would have to be modified to allow removal of the sample from the tank. Due to the restrictions of the existing tank this process was carried out manually and the sample removed to cubic metre bags.

The amount of material removed from the 15 metre squared area was 2.5 tonnes. 0.5 tones were submitted for a co-incineration test and the remainder was removed from the area to a secure IFI store in Roscommon, in the same catchment until a safe method of disposal could be determined.

All equipment was disinfected and the silt curtain was removed. A yellow marker was placed on the bankside showing the extent of the trial area.





Figure 4: Full set up for trial operation.

4. Disposal of Material

The bio-secure safe disposal of the dredged material is another essential element of the trial dredge test as this ultimately determines whether or not and where the excavated material can be disposed. In order to look at all options available samples of the material were taken and analysed in order to classify the waste (Appendix II). The waste code applied for this non-hazardous waste was 17 05 03 or 17 05 06.

There are three options available for this category of waste:

- Municipal Landfill Site deep fill option;
- Co-Incineration requiring testing;
- Full Incineration requiring testing.

4.1 Municipal Landfill Site

The ESB ash pit site was reviewed in conjunction with the Environmental Protection Agency (EPA) to determine whether this site could be used for the disposal of the material as it was within 10kms of Lanesborough on a Bord Na Mona site. The current licence is specific for the disposal of ash and it was reported that an 18 month review of the waste licence would be required for any amendment to be made to the current licence.



IFI engaged with the two local authorities, Roscommon County Council and Longford County Council, to determine whether a suitable landfill site is available within the catchment and what, if any, additional biosecurity options needed to be considered for this type of disposal. There is currently no site available within the Shannon catchment. A Bord Na Mona landfill site was identified in Co. Kildare for disposal which is outside the Shannon catchment. Measures would be required to ensure that this invasive species could not be spread further to any other catchment during transport or at the disposal site. Transport of this live invasive material outside the Shannon catchment would be regarded as very high risk.

4.2 Co-Incineration Test

A sample of waste material from the trial area was submitted to a co-incineration plant within the catchment and was used in tests to determine if the dredged material could be disposed of in a bio-secure manner. Unfortunately whilst the material was destroyed, the company could not include additional material as the organic element would lead to an exceedance in the company's environmental emission licence limits.

4.3 Full Incineration Test

Roscommon County Council is investigating the use of a private incinerator, which is located outside of the catchment, as a possible disposal method. An update is expected in due course. This is also a costly means of disposal.

5. Post Assessment Survey

Following the completion of the trial dredge operation, IFI engaged the services of Geomara, a specialist environmental research diving company to carry out an environmental dive survey at the hotwater stretch in Lanesborough to evaluate the effectiveness of the trial at removing the invasive species. This survey was performed in the treated trial area and outside the trial area in untreated locations. Results of this survey were compared to the results from the previous IFI assessment carried out in October 2014.



The survey reported a significant abundance of clams present in the untreated areas adjacent to the treated area and a reduction in abundance in the treated area. It must be stressed however, that Asian clam was still evident in the treated site. Thus the effectiveness of the dredging operation would need to be considered in the context of the capacity of the Asian clam to regenerate and repopulate an area. A full report is attached in Appendix I.

It is evident that the dredging will not eradicate the Asian Clam but reduces the biomass in the area treated only.



Figure 5: Sample collection technique



6. Biosecurity

Inland Fisheries Ireland closed the hotwater stretch to angling temporarily on the confirmation of the presence of Asian clam, pending a scientific survey and appropriate biosecurity arrangements being implemented. Signage was erected immediately, meetings held with local stakeholders, press releases issued to all local and national media and a notice placed on the IFI website, <u>www.fisheriesireland.ie</u>.

6.1 Disinfection Stations & Biosecurity

Inland Fisheries Ireland, with funding support from the ESB, installed four disinfection stations for the area in key angling and boating locations. A disinfection unit was placed upstream and downstream of the Lanesborough Bridge, one at the boat slip on the Lanesborough access point and one unit placed on the angling section of the Ballyleague river bank. Appropriate signage was erected on the use of the units which were managed by local representatives and IFI staff.



Figure 6 and 7: Disinfection Units installed in Lanesborough and Ballyleague.



A plan was developed, in conjunction with various angling clubs around Lough Ree and the catchment, identifying key potential sites for the installation of disinfection station locations at angling club boat access points. These measures are primarily to prevent anglers and other boat users from spreading the clam from the Shannon to other catchments. These disinfection units would ideally be purchased by angling clubs and all anglers would be required to disinfect their angling equipment, trailers and engines on departure from the Shannon catchment. Angling clubs were also keen to appoint members as 'invasive officers' to ensure that biosecurity protocols were being implemented rigidly.



Figure 8: Proposed disinfection station locations around Lough Ree.

A personal fish keep net ban is also in place in the affected areas but, IFI have liaised with the local community group and tackle shops to provide specific keep nets that can be used and returned. These nets are only available through a deposit and return system with the two local tackle shops. Previously these nets could only be provided under IFI supervision for angling competitions in the area.



It would be recommended to continue the current angling restrictions in these infected areas into the foreseeable future in an effort to prevent any spread of this highly invasive species to other catchments outside the Shannon River Basin District as well as further afield within the Shannon catchment.

7. Findings

The hotwater stretch is considered an internationally renowned coarse fishery for angling. This angling stretch also provides a huge socio-economic benefit to the two towns that span the watercourse; Lanesborough and Ballyleague. The longterm effects of the infestation in this important angling stretch are unknown and needs to be monitored.

The main channel, adjacent to the hotwater stretch, is a busy navigation channel and has the potential to spread the Asian clam further upstream and downstream due to the volume of boat traffic and the increased population of Asian clam within the vicinity.

An awareness campaign should be drawn up to educate local communities, anglers, boat users and visitors of the threats posed by this invasive species and the effects that this and other invasive species can have on waterbodies and the responsibility of all water users to mitigate the threats of invasive species.

The results from the trial dredge operation is that a proportion of the Asian clam can be removed using the suction dredge method with some success. However, this will not eradicate the invasive species; it just reduces the standing stock biomass which may reduce the infestation rate in Lough Ree downstream. This will not halt any further infestation to the catchment even if a wide reaching major removal programme was implemented. It is also worth noting that IFI has conducted many research trials on the removal of Asian clam from the Barrow including dredging, discussions on Bio-Controls, laying of benthic barriers (jute and plastic) etc.. None of these have, as yet, identified a method of safe removal and eradication. There is also research ongoing in both Queens University Belfast and Sligo Institute of Technology looking at control methods for Asian clam.



No safe disposal site or method of safe disposal was identified in the catchment. It is not feasible to implement a large scale removal programme without an appropriate safe bio-secure disposal site.



8. Recommendations

In the light of the fact that:

- the Clams are already located in Lough Ree both above and below the study area and are established in the catchment;
- that the removal method only succeeded in removing a portion of the infestation in the trial area;
- as yet no safe site for disposal has been identified within the catchment;
- any programme of removal will not prevent the infestation from continuing to spread well beyond the hot water stretch –which was in all probability not the point of inoculation;
- an Asian clam control programme is extremely costly and requires substantial manpower and other resources;
- the dredging equipment as described in the trial can only work in shallow water.

It is recommended that a further extensive control programme would not be advisable at this stage. It is stressed that any control programme would also increase the risk of spreading the clam to other catchments particularly in the absence of a safe disposal site in the locality.

In addition it should be stressed that the only options available at present are focused on the reduction of the standing stock biomass in the hotwater stretch. To suggest that this will have any success in halting the spread of the Clam in the Shannon catchment would be misleading.

The cost of any programme of control would be in excess of €150,000 annually and possibly significantly higher. Such expenditure can hardly be justified when the clam is already established elsewhere in the catchment. In addition there is currently no biological control method available that could be used to eradicate the clams



In the light of the above it is recommended that appropriate warning signs are erected at angling stations on the Shannon with priority given to angling stations on Lough Ree. The purpose of which is to advise anglers and boaters alike of the dangers posed by moving wet material or even the clams themselves from the Shannon to other catchments either deliberately or accidentally.

The site should be monitored to establish whether any significant changes in fish stocks occur in the future.

It is also recommended that the water depth regime in the hotwater stretch be monitored to ascertain if any change in this could be affecting the standing stock of fish residing in the area.

Acknowledgements

The following agencies are gratefully acknowledged for their contribution and continued support in dealing with this issue to date. Inland Fisheries Ireland, Waterways Ireland, ESB, Bord Na Mona, National Parks and Wildlife Service, Environmental Protection Agency, Roscommon County Council, Longford County Council, Local community and angling groups.



Appendix I – Geomara Dive Report

Report of

Asian Clam abundance survey (post dredging) Lanesborough, Co. Longford On Behalf of Inland Fisheries Ireland



Project: G15027 Lanesborough Env Dive Survey

Date: 23/06/2015

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1. Introduction

This report details the results of a programme of environmental dive survey carried out at the hotwater stretch of the River Shannon, below the hot water discharge from the ESB electricity generating station at Lanesborough, Co. Longford. The work was carried out on Tuesday 23rd June 2015 in order to evaluate the effectiveness of a trial dredging scheme designed to remove invasive species from the area.

In September 2014, a large population of Asian clam was located in the hotwater stretch of the River Shannon, below the hot water discharge from the ESB electricity generating station at Lanesborough. Initial observations revealed large numbers of live Asian clams inhabiting the coarse substrate in this shallow (to 2 metres) and warm water habitat. As a consequence of the threat that an infestation of Asian clam in this mid-Shannon area might have on angling and tourism in general, IFI temporarily closed the fishery at the hotwater stretch in Lanesborough and erected signage alerting anglers and others of the presence of this invasive organism in the water.

A preliminary report detailing the status of Asian clam in the mid-Shannon reaches and a list of recommendations for management was produced in October 2014. The report detailed the work undertaken to establish the distribution and population status of the Asian clam in the mid-River Shannon (from Termonbarry via Lanesborough-Ballyleague to its inflow in Lough Ree). Preliminary results from the survey provided management recommendations to mitigate the threat from this highly invasive aquatic species.

Part of the recommendations of the preliminary report included dredging the hotwater stretch using long-reach, land-based machinery (as appropriate). It was recommended that this should be used to remove the top 30 cm of substrate, plus Asian clams, from a section of the hotwater stretch.

Waterways Ireland carried out a dredging operation in June 2015, a silt screen was erected at the beginning and end of the dredging area to stop disturbed clams being carried downstream. After the dredging operation was carried out an environmental dive survey in the trial dredge zone and in an un-dredged zone directly adjacent to the trial zone was requested in order to establish the effectiveness of the dredging, the findings are presented in this report.

2. Survey objective

The objective of this survey was to carry out post dredge observations to monitor the efficacy of the dredging operation.

It is recognised that the easiest method of purely quantitative samples is with a Surber Sampler. Surber Samplers can be used in shallow streams less than 0.5m deep with a range of bottoms from silt to large cobble. The sampler consists of a horizontal frame that sets on the stream bottom to border the sampling area and is used to stir up the bottom sediments and invertebrates. A net is attached to the vertical frame to catch the benthic invertebrates and sediments as the horizontal frame is agitated and they flow into the net.

The Environmental dive team entered the dredged area and collected 10 randomly selected Surber samples on the substrate in aftermath of the treatment. In order to compare the efficacy of the dredging operations, 10 randomly selected samples were also collected in the undredged zone directly adjacent to the trial dredge area.

This report details the current status of Asian clam and population status of Asian clam in this area of the hotwater stretch at Lanesborough and provides a comparison of the abundances before and after the suction dredging operation.

3. Methods

Surber samples enabled the quantitative assessment of Asian clam density (per m^2) in the trial dredged zone and adjacent un-dredged zone. 10 no. random $0.25m^2$ quadrate samples were collected using environmental divers. A $0.25m^2$ quadrat was placed on the surface, a mesh net was placed beside the quadrat, surface and subsurface sediment was collected from the quadrate and stored in the mesh bag for subsequent analysis (Fig 1.). Each sample was labelled and placed in individual bags, washed through 16 mm² sieve and the remaining contents were carefully examined for the presence of clams. Counts were made of the number of Asian clams present in each sample and these were averaged.



Plate 1. Sample collection technique

4. Study area

The trial dredged area measured approximately of 15 metres x 15 metres. The trial zone was demarcated in yellow at the start and finish point on the pier wall (Fig 2.).



Plate 2. Demarcated trial area.

The Environmental dive team worked within the trial area, and 10 metres downstream in the adjacent un-treated zone. These areas lay in the hotwater stretch where large abundances of Asian clams were detected in the 2014 survey.



Figure 1.Survey area, Lanesborough, Co. Longford

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5. Results

Asian clams were recorded in each quadrate examined (Trial treatment zone & un-treated zone).

The clams were significantly more abundant in the untreated zone. A mean clam count of 229 individuals (per m^2) was retrieved in the un-treated zone and a mean of 35 (per m^2) in the trial treatment zone.

The sampling indicated that the mean density of the Asian clam population per square metre was greater in the un-treated zone than in the adjacent trial treatment zone (Table 1). The figures reveal more than six time abundance of clams in the un-treated area.



 Table 1. Mean density of clams per m² in survey zone

The number of Asian clam collected in each quadrat are displayed below in table 2.

Site	m²	Site	m²
Dredged zone 1	60	Un-treated zone 1	392
Dredged zone 2	20	Un-treated zone 2	116
Dredged zone 3	72	Un-treated zone 3	216
Dredged zone 4	28	Un-treated zone 4	372
Dredged zone 5	4	Un-treated zone 5	216
Dredged zone 6	64	Un-treated zone 6	28
Dredged zone 7	20	Un-treated zone 7	360
Dredged zone 8	24	Un-treated zone 8	344
Dredged zone 9	8	Un-treated zone 9	156
Dredged zone 10	52	Un-treated zone 10	92
AVERAGE	35.2		229.2

Table 2. Number of Asian clam per m² in the survey zones.

5.1 Comparisons with previous survey

In September 2014 a distribution survey was carried out by Inland Fisheries Ireland to accurately determine the status of Asian clam populations in the mid-Shannon area, from Termonbarry (10 km upstream of Lanesborough-Ballyleague) to the mouth of Lough Ree.

Three techniques were used over this 10 km stretch of water.

- Benthic hand-dredge (50 m-long tows)
- Van Ween grab (area sampled = 0.05 m^2)
- Surber sampler (area sampled = 0.25 m^2)

10 Surber samples were taken in the trial area - hotwater section (Hot Water-2) at Lanesborough to provide an assessment of clam density. Results from the 2014 survey signalled that a highly abundant clam population had become established.

In 2014, the number of clams present in the Suber samples collected in the general area of the hotwater section (Hot Water-2) downstream of the bridge averaged 1370 per m^2 . The survey results reveal a large reduction in the abundance of Asian clam, where an average of 35 clams per m^2 was detected in the trial dredged zone.



Table 3: comparison of clams in pre and post dredge survey

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Appendix 1. Dive Times

DIVE 1	Time in	Time out	Total Dive Time	RG Group	Surface Interval
Diver 1	10.17	11.21	64	"0"	n/a
Diver 2	10.17	11.21	64	"0"	n/a
Diver 3	n/a	n/a	n/a	n/a	n/a
DIVE 2					
Diver 1	12.00	13:07	67	"0"	n/a
Diver 2	12.00	13:02	67	"0"	n/a
Diver 3	n/a	n/a	n/a	n/a	n/a

Table 4. Project Dive Times



Appendix II – Substrate Material Sampling for Waste Categorisation

Sampling Report – Lanesborough Hot water Stretch

Date Samples Taken:10th November 2014No. of Samples taken:3 samples takenLocation of Samples:Upstream of the vehicle bridge, on the Lanesborough Hot-water stretch. Thislocation was chosen as it contains the highest density of Asian Clams per metre squared.



Figure 1: Sample Sites

Method: Anua Labs did not offer any advice to ESB on sample collection and were not in the position to collect samples themselves. ESB environmental staff contacted several other labs to request that they collect samples and none were in the position to collect them. ESB assisted by Inland Fisheries Ireland attempted to collect representative samples from the area being tested.

Benthic Sampling was carried out to obtain the chemical analysis of the substrate and clams with a view to satisfying the waste disposal of the proposed dredged material from the Trial dredge operation. Samples were taken from both sides and from the middle of the channel. Samples were taken by two Inland Fisheries Ireland staff with a Van Veen grab sampler, deployed from a Rigid Inflatable Boat (RIB). Two grab samples were taken at each of three stations. The substrate samples at each of the three stations were transferred to a sterile bucket and brought to the shore (due to inclement conditions) for transferring into sample bottles. This procedure was followed for each station. Shore transfer of samples was handled by ESB staff, under the supervision of Fiona Spellissy. ESB take samples monthly to send to contract laboratories and are aware of the correct sampling procedures to use to avoid contamination. It would be standard practice to store samples in a cooling box and the contract lab would provide the necessary sample bottles , prepared as per testing requirements and samples would have been delivered via courier to the contract lab. Samples were transferred to Bord Na Mona labs for analysis.

Analysis: Analysis was carried out on two samples. The third sample was deemed inappropriate due to the volume of liquid contained.

Bio-security: All sampling gear and RIB were cleaned and de-fouled following sampling. Hot water power washing of the RIB and trailer was carried out in Lanesboro. Surfaces of the RIB and sampling gear and sampling attire were sprayed with 1% virkon aquatic solution, as per Inland Fisheries Ireland protocols.



Rational for sampling: The sampling took place at the three sites which have the highest density of Asian Clam. The samples taken are deemed to be a representation of the substrate towards the categorisation of the material for disposal for a trial dredge operation. The Trial dredge operation will cover an area of 15 metre squared (as per schematic below), downstream from the vehicle bridge in the hot-water stretch. There are no boat activities in the hot-water stretch. All angling takes place from the shore.



Figure 2: Trial Dredge Schematic.

The Trial Dredge Method statement is contained within the Appropriate Assessment Screening Report. Waterways Ireland is prepared to carry out this trial using a suction method and monitoring of this method will be continually assessed throughout the operation. The estimated volume of dredged material from this operation is 80 tonnes.

European Waste Code: 17 05 03 or 17 05 06.

Waste Acceptance Criteria:

There following options are currently being investigated for the waste disposal.

- a) Municipal Landfill
- b) Co-incineration
- c) Full Incineration

The preferred option would by co-incineration due to a facility available within the ShRBD catchment. A site visit to this facility will take place in February.





Figure 2: Picture of Downstream Trial Dredge