

THE WESTERN REGION ZEBRA MUSSEL CONTROL INITIATIVE

Presents a seminar entitled:

ZEBRA MUSSELS & OTHER ALIEN INVADERS



BOOK OF ABSTRACTS
THURSDAY 9TH MARCH 2006

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Seminar Programme**

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Welcome

Dear colleagues and friends,

Welcome to the Seminar on Zebra Mussel control entitled '**Zebra Mussels and Other Alien Invaders**'. This seminar is being organised by the Western Region Zebra Mussel Control Initiative and the major sponsor is The National Parks and Wildlife Service. The list of invited lecturers speaks for itself and many of them are world experts in the field of Zebra Mussel control. Their presence will enable a wide range of relevant topics to be presented and discussed.

The Western Region Zebra Mussel Control Initiative began as an action of the Natural Heritage Working Group of Galway County Heritage Forum in the spring of 2004. This was proposed by Greg Forde and Michael Hynes. A working group was established with the aim of preventing the spread of Zebra Mussels to the Corrib and the other Great Western Lakes, Mask, Carra and Conn. The initial funding was provided by The Heritage Council and Galway County Heritage Forum. The Initiative was launched at Ower House in Greenfields in April 2004. Prior to this, 10,000 copies in English and 1,000 copies in Irish of a Zebra Mussel brochure were printed. A large number of anglers and representative of the boating organisation attended the launch.

In the early days of the Initiative, the major contributors to the working group were Galway County Heritage Forum, The Western Regional Fisheries Board (WRFB) and the Corrib Branch of the Inland Waterways Association of Ireland (IWAI). Since then, the Initiative has expanded and other organisations have joined in our efforts to prevent the spread of Zebra Mussels. These include The National Parks and Wildlife Service, Mayo, Sligo, Leitrim, Roscommon and Clare County Councils and Galway City Council, The Northwestern Regional Fisheries Board, The Shannon Regional Fisheries Board, The Office of Public Works, The Carra Mask Corrib Water Protection Group Ltd., the Trout Angling Federation of Ireland and Conn Cullin Angling Federation.

Experience gained in the US showed that educational programmes were the most effective way of preventing the spread of Zebra Mussels and from the outset, this was the approach taken by the Initiative. While most of the action in 2004 involved distribution of brochures in fishing tackle shops, hotels and guesthouses and visiting launching sites, the campaign intensified in 2005. A revised version of the brochure was printed and has been widely distributed throughout the country. In collaboration with the WRFB and Galway County Council, warning signs were erected at about 50 launching sites around the Corrib. This activity spread to the other County Councils and by now there are signs at most of the launching sites around most of the western lakes. The official unveiling of the signs was carried out at Oughterard Pier on Friday 15th April 2005 by Éamon Ó Cuív Minister for Community, Rural and Gaeltacht Affairs.

The award of a €30,000 grant by The National Heritage Forum in December 2005 has enabled us to greatly expand our signage and over the coming months approximately 70 A0 and 123 A1 signs will be erected around the western lakes. We all owe a debt of

gratitude to Marie Mannion who made the initial application for the funds to carry out this task and I take this opportunity to publicly thank her for her continued involvement and support. The warning signs will be erected at Zebra-Mussel infested sites as a priority action and subsequently at Zebra Mussel-free waterways in the West and along the western side of the Shannon. The representatives of the Regional Fisheries Boards and Local Authorities involved in the Initiative liaised with Aoife Thornton to produce a list of sites that would be most effective in propagating the message about the risks from Zebra Mussels. This excellent cooperation is gratefully acknowledged.

By May 2005, financial commitments by the various partner organisations involved enabled us to advertise for an Education Officer. Following interviews on 3rd May 2005, Dr. Aoife Thornton was appointed to the position of Education Officer of the Western Region Zebra Mussel Control Initiative. Aoife's appointment marked a turning point in our efforts in that for the first time, we had someone who was working full-time on the activities of the Initiative. She quickly mastered the project and has proved to be an excellent choice. She has worked tirelessly on the project and was instrumental in bringing in the new partners. She has produced monthly reports, has attended angling competitions and has given talks and presentations to schools, angling and other organisations. She had done numerous radio interviews and has also appeared on TV. She has also written articles for a number of relevant publications including Foinse, Heritage Outlook, and the TAFI Newsletter. Aoife regularly produces press-releases for the national and local media in the western/Shannon region. Michael Hynes published articles and updates in Inland Waterways News and the Irish Anglers Digest.

An information package suitable for use on websites was produced and sent to the representatives of each Local Authority involved in the Initiative. This information was also sent to other relevant organisations. This information may be accessed on www.galway.ie. It includes a list and map of the currently known Zebra Mussel infested sites in Ireland. Also included are links to educational sites for children and methods to help prevent the spread of Zebra Mussels for waterway users. Additional links to organisations involved in Zebra Mussel control are available at <http://www.nuigalway.ie/chem/Mike/homepage.htm>

Outreach actions have also proved helpful in preventing the spread of Zebra Mussels. To this end both Aoife Thornton and Michael Hynes have given presentation to schools, angling groups and other interested organisations. A selection of videos is also available and these are used as part of the outreach programme.

Michael Hynes appeared in a video entitled '*Start a Revolution, Save Lough Corrib*', which was produced by the pupils of Scoil an Chlochair, Oughterard, Co. Galway. The pupils produced a DVD on the issue of pollution and of the threat posed by Zebra Mussels on Lough Corrib. The DVD was produced thanks to the Fionn Science Project for schools. The Education Officer is using the DVD as an educational aid in other schools.

During the summer of 2005 a series of radio advertisements were broadcast on local radio stations in the west and along the Shannon, Galway Bay FM, Ocean Fm, Shannonside Northern Sound, Mid-West Radio, Tipperary FM and Clare FM. The voice-over for this was done by Michael Hynes and the response has been good. Initial surveys show that up to 60% of the general public in the catchment area have heard of Zebra Mussels.

In order to ascertain how effective our campaigns have been, we have carried out a limited amount of survey work using a form designed by Michael Hynes. However, we have subsequently been fortunate in that Sorcha O'Brien a journalist who is doing an M.Sc. in World Heritage Management with University College Dublin and UNESCO is using the Zebra Mussel control Initiative as the subject of her thesis. She is using a simplified version of the original form and her work will hopefully enable us to produce a quantitative evaluation of our efforts. She has distributed a number of forms to carefully selected groups and to date, the number of returns has been very good.

Over the past two years, many people and organisations have contributed to the Initiative. However, it would be remiss of me not to mention the following:

Marie Mannion, Heritage Officer, Galway County Council: She has been a tower of strength and it is largely through her efforts that funding for the Initiative has continued. Without her input, there would be no Initiative.

Christina Sullivan of Galway County Council and Kevin Rogers of the Western Regional Fisheries Board: Both Tina and Kevin have been on board since the very beginning of the Initiative and have contributed greatly to it. Their continued support and encouragement is gratefully acknowledged.

Beatrice Kelly and The Heritage Council: Without the initial financial contributions of the Heritage Council, it would have been impossible to mount the Initiative as it is now. Their continued support and encouragement is greatly appreciated.

Con McCole of the Carra, Mask, Corrib Water Protection Group. Con and his group have been partners from the very early days of the Initiative and his experience and wisdom has been of major assistance. He has close contact with anglers all over the west and his efforts have been instrumental in bringing the angling organisations on board.

Noel Kirby and Peter Carvill of the National Parks and Wildlife Service: Noel has been a partner from very early on and his knowledge of the legal aspects of alien and invasive species has been invaluable to us. Without his expertise we would have gone down many a *cul de sac*. They have also been generous in organising the funding of both this seminar and equipment that has enabled Aoife to carry out her work more efficiently.

Martin Butler of the Western Regional Fisheries Board was instrumental in organising the launch at Oughterard, Co. Galway and contributed greatly to the Initiative and to the erecting of warning signage.

Dan Minchin of Marine Organisms Investigations: Dan has worldwide experience of alien and invasive species and few can match his scientific expertise of the area. He has given us a number of presentations and has given freely of his advice over the course of the Initiative. Unfortunately, his overseas work prevents him from attending the seminar.

Henry Comerford. Henry is the author of the standard reference books on fisheries legislation in Ireland and has given us a number of excellent briefings on this *gratis*.

Greg Forde, Máire Ní Chionna, John Conneely, Pamela Bergin, Eileen Gibbons, Margaret Sweeney, Lorraine O'Donnell, Lal Faherty, Lawson Clements, Anthony Waldron, John Fahy, Frances Lucy, Congella McGuire, Seán Ward, Kieran Madden, David Fallon, Cormac McCarthy, Paula Treacy and all the other people who have given

of their time and energy, we thank you all and look forward to your continued cooperation.

Sincere thanks are due to Bríd Costello and Olivia Finn, Environment Section, Galway County Council who have provided administrative assistance for the seminar. Thanks also to the staff of the Planning, Development and Control Section of Galway County Council for their help. In particular thanks are due to Gráinne Smyth, Mary T. Smyth, Lorraine McTigue and Sajil Elwood for administrative assistance with the seminar.

To: Sinéad Cannon, Mark Conroy, Ciarán O'Donnell, Chris Averill and Karen Jordan (IT Section Galway County Council), thanks for your willingness to assist Aoife through your technical expertise for the Zebra Mussel website and map production etc.

Thanks to Damien Goodfellow (Jaycee Printers) who produced the cartoon image of the angler and hitch-hiker Zebra Mussel characters (see front cover).

Thanks to Leanne Judge and the staff of the Claregalway Hotel for the professional way in which they assisted Aoife in organising the seminar.

A special word of thanks to the speakers who have taken the time to prepare the presentations we are about to hear. Special thanks to Doug Jensen who has travelled from the US to share his enormous expertise with us. We do appreciate his assistance and advice over the past two years.

We sincerely hope that you will all benefit from your attendance at the seminar and that you will find it a stimulating and informative event.

Beir bua agus beannacht.

Michael J. Hynes, B.Sc., Ph.D., D.Sc., CChem., FRSC
(Chairperson of the Western Region Zebra Mussel Control Initiative)

The Partner Organisations

Galway County Council Heritage Forum
The Heritage Council
The National Parks and Wildlife Service
Mayo County Council
Sligo County Council
Clare County Council
Roscommon County Council
Leitrim County Council
The Inland Waterways Association of Ireland (Corrib Branch)
The Carra Mask Corrib Water Protection Group
The Western Regional Fisheries Board
The Shannon Regional Fisheries Board
The Northwestern Regional Fisheries Board
The Trout Angling Federation of Ireland
Conn Cullin Angling Federation

Zebra Mussels – Successful Invaders to Ireland’s Waterways

Frances Lucy

School of Science, Institute of Technology, Sligo.

The zebra mussel (*Dreissena polymorpha*) arrived in Ireland in the early 1990s. This shellfish spread to most parts of the Shannon navigation by the late 1990’s. Zebra mussels have also successfully colonised a number of waters outside the Shannon hub including lakes in Counties Clare, Sligo, Leitrim and Roscommon.

This presentation will detail the biology of the zebra mussel, explaining the life-cycle, reproduction, feeding and ecology of the species. Reasons for the success of this mussel in Irish waters will be outlined. Detailed information will be given on the dynamics of zebra mussel populations in Lough Key, Co. Roscommon.

Dr Frances Lucy is a lecturer at the Institute of Technology, Sligo, where she coordinates a Higher Certificate in Fisheries Management for The Central and Regional Fishery Boards. She has been researching zebra mussels since 1998, carrying out surveys for the EPA and the Marine Institute.

Ireland's Changing Fauna: Biogeographical, Ecological and Fishery Management Perspectives.

T. K. McCarthy

Department of Zoology, National University of Ireland, Galway

The composition of Ireland's freshwater fauna has been influenced by the island's size; geographical location; past and present environmental conditions; and the varying natural dispersal abilities of the different animal species that have managed to colonise its inland waters. The aim of this presentation will be to provide a biogeographical context to the consideration of relatively recent additions to the fauna, such as zebra mussels. Natural colonisation processes, though still occurring, have now largely been eclipsed by the extent to which non-indigenous species are being introduced. Analysis of the ecological effects of such introductions requires more effective monitoring programmes and recognition of the specialist taxonomists, and biological recorders, who can accurately identify introduced species. Increased support for appropriate training and research is strongly recommended. Likewise, greater public awareness of the potential economic harm that can result from deliberate or accidental introduction or translocation of species needs to be promoted. In particular, anglers and fishery managers need to be more proactive in this regard. They also need to be aware of the extent to which they have contributed to such adverse ecological change. The introduction and spread of introduced coarse fish, the increasing infections of eels by Asian parasites and the progressive changes in the invertebrate biodiversity Irish freshwater communities will be discussed.

Measured Changes in Ecology and Fisheries of the Erne System following Zebra Mussel Introduction.

Robert Rosell

Department of Agriculture and Rural development for Northern Ireland

Surveys of Lower Lough Erne fish have been carried out at approximately 3 year intervals in their present form since 1991. A series of multi-mesh gill nets are deployed between July and September at a range of sites covering all the margins of the Lower Lough and Back Lough north of Boa Island. The nets are designed to take a sample of all sizes greater than one year old of all species present. Typically, a full survey involves 30 net-nights sampling, nets set overnight and covering one dusk and one dawn period. Results are expressed in terms of numbers of fish per net and mean weight of fish per net, for comparison between surveys. Length frequency distributions are also examined.

The 2004 survey was the first likely to show fish population level impact of zebra mussels. ZM were introduced in 1996 and by 1999 had reached saturation levels. They have the potential to affect fish populations by filtering algae from the water column altering food webs, and by creating new habitats and food sources on the grounds they cover. Their proven effects are reduced plankton numbers and increased water clarity. Algal filtering is not indiscriminate – there has been change in the balance of algae to single species blooms of *Microcystis* sp, containing potentially toxic species. There is as yet no evidence that the *Microcystis* strain now forming mono-specific summer blooms in Lough Erne has caused any toxic events. Increased water clarity favours growth of water weeds, particularly in upper Lough Erne, providing new habitat for fish preferring weed cover.

The period of zebra mussel establishment coincided with a long gap in roach recruitment – for a period of 8 years numbers of young fish were low. However, a new strong group of roach appeared in 2002/3, likely to maintain roach stocks for a decade or so. This variable breeding success of roach is natural and commonly observed elsewhere. Perch have been the winners from the zebra mussel invasion. Their numbers have increased dramatically with the 1 year old group in 2004 being the strongest observed since surveys began, double the abundance of any prior annual brood. There are clear links between perch and zebra mussels – the ZM colonies provide a habitat for perch food items, and clearer water and weed cover assists perch feeding behaviour. Comparison of stored and new opercular bone samples indicates possible increase in juvenile growth rates

Other larger fish are not significantly changed in abundance, or changes are undetectable given the inherent variability in gill net catches. The one perhaps significant observation is the increase in roach-bream hybrids. These are strong mouthed fish with the demonstrated capability of feeding directly on zebra mussels.

An additional series of large mesh, single mesh size nets is used to examine the changes in take-able trout, pike, larger bream, roach and hybrids. The numbers of smaller trout

and pike as determined by the smaller mesh survey net series are within previously observed ranges. It would be expected that zebra mussels should be neutral or beneficial to pike and trout by increasing their ability to feed by sight. These species, however, do eat zooplankton when young, and the zooplankton are reduced in abundance. These species have very particular requirements independent of any zebra mussel impact. Pike are prone to loss of spawn if the lake levels drop in early spring, and trout are dependent largely on conditions in feeder streams for their spawning and early life history.

In conclusion, the angling fish stocks in the lake are healthy. Perch have increased in abundance. Roach failed to recruit well during the zebra mussel population expansion, but appear to have recovered somewhat since 2002. Other species are within previously observed ranges.

Lecturer's Background

Robert Rosell graduated from The University of Liverpool in 1983 (Liverpool), with an Honours degree in Marine Biology (Upper second). Following completion of a PhD "*In vitro* culture of crustacean eggs", also at Liverpool University, he joined the Department of Agriculture for Northern Ireland as a marine environmental biologist (Higher scientific Officer) in 1986. Following internal re-organisation and promotion to Senior Scientific officer within DANI (now Department of Agriculture and Rural development for Northern Ireland) in 1991, he has been engaged in research projects and in providing NI, and UK government with scientific advice on freshwater fisheries and related environmental issues.

The Socio-Economic Impacts of Water-Based Tourism (Recreational Angling and Leisure Boating) in Ireland and the need for Sustaining a Viable Tourism Product.

Anne Wilkinson

*Marine Institute Programme Manager Water-based Tourism and Leisure. Marine
Institute, Galway.*

Abstract:

Marine and water-based tourism and leisure makes a major contribution to the Irish Tourism Industry. Our key natural resources of 4,000 miles of high quality coastal waters, 4,000 lakes, 75 major river catchments and over 450 miles of navigable inland waterways provide the resource base for this important economic sector. The products, services and activities that make up the marine tourism sector all have one common link – they are dependent on a high quality environment. The environmental impacts of the continuing spread of zebra mussels can compromise the quality of our lakes and waterways for angling and boating. In the highly competitive world of tourism we cannot afford to compromise the quality of our environment.

Lessons from the United States in AIS Education

Douglas A. Jensen

Aquatic Invasive Species Program Coordinator, University of Minnesota Sea Grant Program, U.S.A.

As in the United States, zebra mussels (and other aquatic invasive species, or AIS) are invading Irish waters. When zebra mussels appeared in the Great Lakes, several strategies were implemented to address the invasion, including boater education. From our efforts to educate boaters, we learned what strategies work to prevent, contain and minimise their impacts. Results of a survey show that education can significantly change boater behaviour. Effective AIS education stresses why prevention is important, taps motivations and attitudes, and delivers concise, consistent messages. Building upon proven approaches, two U.S.-based campaigns (*Stop Aquatic Hitchhikers!* and *Habitattitude*) are changing the attitudes of boaters and anglers, and aquarium enthusiasts. This presentation will highlight strategies, campaigns, and resources that can be used to develop and implement AIS education programs.

Lecturer's Background

Doug Jensen is an expert in aquatic invasive species education. As the AIS program coordinator for the University of Minnesota Sea Grant Program in Duluth, he brings an outcome-based approach to public education through a unique lens of behavioral science, social marketing, media relations, evaluation, environmental education, and research. He has provided leadership on AIS issues ranging from international levels. Doug has published several educational resources including a videotape, *Stop Exotics, Clean Your Boat*, featuring John Ratzenberger, an actor from the TV show *Cheers*. He is co-leading *Habitattitude*, a national campaign aimed to prevent the release of unwanted aquarium fish and plants. He is also leading implementation of the *Stop Aquatic Hitchhikers* campaign with partners in three states. In addition to 13 years of experience with Sea Grant, Doug was a research biologist with the U.S. Environmental Protection Agency. He has (nearly) a M.S. of Education and a B.S. in Biology from the University of Minnesota Duluth.

Law and Policy in Relation to Invasive Species in Ireland

Peter Carvill

Assistant Director of the Species and Regulation Unit, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government

Reference will be made to the provisions in the Wildlife Acts that are pertinent to aquatic invasive species. The general policy approach that the Department of the Environment, Heritage and Local Government is taking towards this issue will be outlined.

Boat Washing Stations: Just a Leaky Sieve?

Douglas A. Jensen

Aquatic Invasive Species Program Coordinator, University of Minnesota Sea Grant Program, U.S.A.

Boat washing stations are often considered to prevent and slow the spread of aquatic invasive species (AIS). Over the last decade, several portable and permanent stations have been tried in the U.S. and Canada's Great Lakes region. In all cases, each was discontinued after a few years. While boat washing stations may be effective in certain applications (e.g., marinas), these cases suggest that they have limited potential and should only be supported in education programs as a tool. Boater education programs emphasizing self-inspection and removal of AIS are a more effective method of controlling AIS than boat washing stations. This presentation will highlight the pros and cons to help you to decide if boat washing stations may be feasible for controlling the spread of AIS in your region.

Non-Native Freshwater Plants in Ireland

Joe Caffrey

Central Fisheries Board, Swords, Co Dublin.

The number of non-native freshwater macrophytes species recorded in Irish watercourses has increased significantly since 1990. Serious concern has been expressed among a broad range of interest groups because of the potential adverse ecological, economic and social consequences that can attend the presence of such species. However, it should be acknowledged that not all non-native species are invasive and that current problems are caused by only a small percentage of those plants that have been introduced into the country. Whether or not an introduced plant will become a true invasive is influenced by a number of factors. These include the number of propagules that the species is capable of releasing into the new habitat, the biological traits of the introduced species, the competitive abilities of the indigenous species, and the susceptibility of the habitat to invasion. The presence of a truly invasive species is evidenced by an unexpectedly rapid biomass expansion and a demonstrable adverse impact on native communities. A number of non-native freshwater macrophytes have recently been listed as potentially high impact species by the Environment Protection Agency in Ireland as part of their Alien Species Risk Assessment. These include *Crassula helmsii*, *Elodea nuttallii*, *Azolla filiculoides*, *Hydrocotyle ranunculoides* and *Myriophyllum aquaticum*. These are species that are currently deemed to pose a significant risk to Irish native community diversity. Another aquatic plant, *Lagarosiphon major*, was not included in the list but is now considered to represent a significant potential risk to the environment.

During 2005 two invasive species, *L. major* and *E. nuttallii*, came to particular prominence in Irish watercourses. Where they were recorded both expressed themselves as true invasives by producing virtual plant monocultures, by rapidly expanding their range within the affected habitat and by displacing indigenous plant species and communities. Furthermore, their presence significantly impacted amenity usage of the infested waterbodies.

The presentation will focus primarily on the distribution of *Lagarosiphon major* in Ireland and, more particularly, on the detailed distribution of this aggressive invasive alien in Lough Corrib. Results from preliminary investigations conducted on the weed in the lake by the CFB and the WRFB will be presented, and compared with findings from other countries where the plant has taken up residence.

The need for comprehensive and enforceable legislation, a clear and concise education and awareness programme, and a workable suite of efficient, environmentally sensitive and cost effective control methods to prevent the entry and spread of invasive alien species in the country will be highlighted.

Zebra Mussels: An Angler's Perspective

Con McCole

Carra Mask Corrib Water Protection Group Ltd.

After the discovery in the Shannon of the first zebra mussels in Ireland, the anglers of the Great Western Lakes did not feel any particular threat from them to their waters. They seemed a long way off in the Shannon and we were blissfully unaware for a number of years of the ease with which they could be transported to our waters and of the damage which they could cause to the bio-diversity of the Great Western Lakes. It was not until about the year 2000 that a ripple of concern came to the fore within the representative organisations of the anglers. While some anglers around the lakes became concerned about the launching of boats by anglers coming from outside the catchment, the majority of local anglers ignored the threat.

It was not until the launch in May of 2004 of the Western Zebra Mussel Control Initiative Group and the ensuing publicity of the launch, that the anglers showed any real concerns about the zebra mussel risk to the Great Western Lakes. That concern was expressed by wholehearted angler representation within the group and support for the group Initiatives. The anglers had hoped that through pressure from the group, bye-laws could be quickly enacted to give legal protection to the Great Western Lakes from the introduction of zebra mussel infested boats or equipment. They have however been disappointed that to date the necessary legislation has not been enacted. In the meantime there has been an excellent public awareness and education campaign launched by the Western Zebra Mussel Control Initiative Group which has been spearheaded by Galway County Council. The anglers have been involved at all levels in their support for this project.

At the present time there is a feeling of inevitability among the angling fraternity, that the Great Western Lakes will become infested with zebra mussels. They see almost daily, boats being launched onto the lakes without check and which come from areas where the waters are infested with zebra mussels. They feel that the education and public awareness campaign is doing an excellent job and should be continued into the future, but that it also needs to be backed up by legislation to deter those careless individuals who are found in all walks of life and who do not voluntarily submit to doing the right thing by their fellow man.

A Review of the Effectiveness of Awareness and Education Campaigns for the Zebra Mussel in Ireland

Sorcha O'Brien

Continuing Professional Education, UCD.

This research compares and contrasts the results of a distributed survey regarding zebra mussels (*Dreissena polymorpha*) in Ireland. Three distinct groups were targeted, anglers as people who interact with our national lakes and Loughs on a frequent basis; the general public as people who are recreational water users and interact with our lakes and Loughs regularly but not as frequently as anglers and an educational institute, specifically a scientific/environmental course.

These sectors were surveyed to establish a number of factors. The first factor is the varying levels to which awareness and education campaigns are influencing the amount of knowledge people in Ireland have on the zebra mussel. The second factor is where the knowledge was acquired, thus enabling the production of a set of recommendations for the development of a national zebra mussel management strategy. It is believed that the core of this strategy will be sufficient to use as the basis for the management of other invasive species.

As research is still ongoing today's presentation will concentrate on some of the preliminary research findings associated with anglers.