

Interaction between biological research and management of freshwater fisheries in Ireland

Interaction entre la recherche biologique et la gestion des pêches dans les eaux douces d'Irlande

Vincent Roche,

Regional Manager,
The North Western Regional Fisheries Board, Ireland

Abstract. – The purpose of the paper is to describe the practical application of scientific research on Lough Conn, a top class trout lake in Ireland. The main work carried out is enforcement of fishing laws, control of predators (pike) and competitors (perch), stream development and water quality control which is the principal subject covered by the paper.

Despite rigorous enforcement of water pollution laws, Lough Conn suffered from a major eutrophication problem in 1990. Following two separate studies by biologists, a number of measures were put in place to redress the situation.

The Regional Fisheries Board immediately intensified inspection of farmyards throughout the catchment and, in conjunction with other agencies, commenced regular weekly sampling of 13 feeder streams and rivers to the lake with a view to pinpointing any increase in phosphate loadings. Both projects are ongoing. The Board has also been working with a State peat harvesting company to reduce deposits of peat silt and is liaising closely with the forestry authorities to ensure that run-off of silt, fertilisers etc. from afforestation work is kept to a minimum. Sewage plants and septic tanks around the catchment are also regularly inspected.

The objective of this paper is to illustrate the practical aspects of fisheries management in Ireland and the extent to which the findings of scientific research are applied in practice.

Key words. – Salmonid - Fisheries - Management - Water - Quality.

Résumé. – Le but de l'article est de décrire l'application pratique de la recherche scientifique sur le Lough Conn, un lac à truite de haut de gamme en Irlande. Le principal travail rapporté est le renforcement des lois sur la pêche, le contrôle des prédateurs (brochet) et des compétiteurs (perche), le contrôle de l'aménagement du cours d'eau et de la qualité de l'eau.

En dépit d'un renforcement rigoureux des lois sur la pollution de l'eau, le Lough Conn a souffert d'un problème majeur d'eutrophisation en 1990. A la suite de deux études biologiques distinctes, un certain nombre de mesures furent mises en place pour redresser la situation.

La Direction des Pêches intensifia immédiatement l'inspection des activités d'élevage du bassin versant et, avec d'autres services, commença des prélèvements hebdomadaires systématiques de 13 affluents au lac dans un but d'évaluer les apports en phosphate. Les deux actions continuent. La Direction des Pêches a aussi travaillé avec une compagnie d'État de récolte de la tourbe pour réduire les dépôts de tourbe et est en relation étroite avec les autorités forestières pour s'assurer que les arrivées de limon, de fertilisants, etc... issues des activités forestières sont minimales. Les rejets d'usines et les fosses septiques du bassin versant sont aussi régulièrement inspectés. L'objet de ce papier est d'illustrer les aspects pratiques de la gestion des pêches en Irlande et l'importance prise par les découvertes de la recherche scientifique en pratique.

Mots-clés. — Salmonidés - Pêche - Gestion - Eau - Qualité.

1 INTRODUCTION

Seven Regional Fisheries Boards are responsible for conservation, development and promotion of inland fisheries in Ireland. The Boards were established under the Fisheries Act 1980. The work of the Regional Boards is co-ordinated by the Central Fisheries Board. As well as providing a co-ordinating role, the Central Board provides various technical services for the Regional Boards including fisheries research. The findings of many years of research are applied by the Boards in their work in managing and overseeing management of fisheries generally.

2 FUNCTIONS OF THE NORTH WESTERN REGIONAL FISHERIES BOARD

2.1 The main functions of the Board are:

- Enforcement of the fisheries laws
- Development of fisheries

— Protection of water quality

— Administrative functions e.g. issue of licences etc.

2.2 The Board has a permanent staff of around 30 persons and this is supplemented by employment of temporary staff during the summer period. *Enforcement of the fisheries laws* represents the largest part of the Board's work, particularly prevention of illegal salmon fishing. For this purpose, the Board carries out patrols around the coast of the region and on all salmon bearing rivers and lakes. This paper concentrates on the work carried out by the Board on management of a large salmonid lake namely Lough Conn, with particular reference to measures aimed at maintenance and improvement of water quality.

3 LOUGH CONN

Lough Conn is a large limestone lake covering approximately 13,000 acres. It is part of the River Moy system and the Moy is, of course, internationally renowned as a salmon fishery. The lake is best known, however, as a wild

brown trout fishery. It is a highly scenic lake which produces in the region of 6,000 brown trout annually and several hundred salmon. Together with the River Moy, it is tremendously important to the local economy as it attracts large numbers of visiting anglers from all over Ireland and from abroad each year.

4 MANAGEMENT OF LOUGH CONN

4.1 Main Elements of th Board's Work on Lough Conn

The main elements of the Board's work in relation to management of Lough Conn are as follows:

- Enforcement of the fisheries laws and regulations,
- Predator (pike) control,
- Competitor (perch) control,
- Habitat improvement work,
- Cropping of streams,
- Water quality control and monitoring.

An overall fisheries management and development plan for the Moy system, which includes Lough Conn, was published by the Board earlier this year (Anon. 1992).

4.2 Enforcement of Fishery Laws and Regulations

Enforcement of the fisheries laws involves carrying out patrols on the lake

to ensure that salmon and trout are not taken by illegal means. A minimum size limit of 10 inches applies on Lough Conn and this is also enforced by the Board as well as the requirement that salmon anglers possess a State licence.

4.3 Pike Control

Mixed fisheries are not an option in Ireland and, for successful management of a game (salmon and trout) fishery, it is vital that pike numbers be kept under control; otherwise, the stock of trout would quickly be depleted and the pike would also prey on salmon smolts making their way downstream (Toner, 1959; Beyerle and Williams, 1986; Anon, 1986 and Fitzmaurice, 1992).

4.4 Perch Control

Perch are major competitors with trout for a broad range of invertebrate food items. A large stock of perch can seriously limit trout production and reduce insect hatches (Moriarty, 1963; Thorpe, 1974; Anon, 1986 and Gargan and O'Grady, 1992). For this reason, the Board has for many years been removing large numbers of perch from the lake. This is done mainly by the use of wire mesh traps which are placed in the perch spawning areas.

4.5 Habitat Improvement works

Research has shown that trout stream development programmes have been

very successful (Anon, 1986). The Board carries out various maintenance and improvement works on spawning and nursery streams to ensure that the best possible habitat is available for trout spawning and survival of young fish. Such works consist mainly of loosening of spawning gravels and the erection of barriers to create holding pools.

4.6 Cropping of Streams

From time to time, the Board "crops" larger trout from nursery streams, by means of electro-fishing, and transfers them to the lake; this ensures that a greater food supply is available for juvenile fish.

5 WATER QUALITY CONTROL AND MONITORING

5.1 Lough Conn Eutrophication Problem

5.1.1. In 1990, Lough Conn suffered a severe algal bloom for much of the angling season. This was much more severe than anything previously seen on the lake and was so bad that the lake became unfishable at times with anglers' flies becoming clogged with algae. Given the importance of Lough Conn as a game fishery and its value to the economy of the area, apart from its value as a local recreational outlet, there was strong local reaction to the apparently very serious deterioration

in water quality. Two biologists from the Central Fisheries Board were called in to examine the situation. The first of these, Dr. Trevor Champ, found that Lough Conn had reached "an alarming level of eutrophication" (Champ 1990). He said the extent of the enrichment had not been evident from the analysis of monthly samples taken at mid-lake locations over a number of years. He recommended a concerted effort to establish the principal sources of nutrients, which were causing the excessive algal growth and the implementation of corrective measures as a matter of urgency.

5.1.2 A second biologist, Dr. Martin O'Grady, carried out a fish stock survey (O'Grady 1990). He used the same methods as had been used in earlier surveys in 1978 and 1984. This time, however, his findings were very different. Firstly, a large population of char, which had been found to be present in 1978 and 1984, had apparently collapsed. Char are considered to be the best indicators of clean water conditions in lakes and Dr. O'Grady concluded that the sudden and dramatic fall in the stock of this species was most likely related to the onset of cultural eutrophication. Secondly, he found that while the trout population was similar to 1978 and 1984, i.e. approximately 500,000 trout, the average size of fish had increased substantially; this again, he attributed to enrichment. Like Dr. Champ, he recommended urgent action to pinpoint the sources of enrichment and the implementation of corrective measures.

5.2 Pollution Control Measures

5.2.1 Farmyard Inspections

As there was little or no industry in the catchment, the suspicion was that agricultural effluent was the main cause of enrichment of the lake. Two fisheries staff were deployed, on a full-time basis, on continuous inspections of farmyards right throughout the catchment, an area of approximately 250 square miles. Report sheets were completed in respect of more than 500 farms and all problem cases were logged for further investigation by the Board's Fisheries Environmental Officer, an Environmental Science graduate.

A total of 140 warning letters were issued, two farmers were prosecuted and 230 farms are now being inspected regularly. This work has resulted in a major improvement in management of farm effluent in the catchment.

5.2.2 Sewage Inspections

Particular attention was also paid to possible sewage discharges from various points including private houses, hotels, a school and an out-dated local authority sewage plant. One hotel was prosecuted and, as a result of pressure from the Board, two hotels and a large school installed modern sewage treatment systems. The Board is at present prosecuting the Local Authority in relation to discharges at the municipal sewage plant which discharges to the River Deel, the main tributary of Lough Conn.

5.2.3 Monitoring of Planning Applications

The Board's Fisheries Environmental Officer monitors all planning applications in respect of proposed house construction or other developments around the lake shore. The siting of septic tanks around certain parts of the shoreline is a particular concern due to inability of soils to absorb effluent (Thorne 1988).

5.2.4 Phosphate Loading Study

A phosphate loading study was initiated in conjunction with the Regional Water Laboratory and the Local Authority. All major feeder streams to the lake are sampled on a weekly basis for phosphate and flow readings. Any significant rise in phosphate readings is communicated to the Board's inspection staff who immediately concentrate their work in the area indicated.

5.2.5 Monitoring of Peat Silt Pollution

A state company is engaged in harvesting milled peat, used for electricity generation, in part of the catchment. Substantial quantities of this can be washed into rivers and streams. As well as having a highly adverse effect on spawning beds (Gargan and Caffrey 1990), there is some evidence that such peat deposits can result in release of phosphates under certain conditions. Research on this by the Environmental Research Unit of the Department of the Environment has not yet been completed. Close monitoring of the

problem and liaison with the peat company have resulted in major improvements in peat silt management.

5.2.6 Forestry Developments

Part of the Lough Conn catchment has also been subjected to afforestation. The Fisheries Board has been monitoring this closely and has been working with the forestry authority to minimize the impact on water quality by adhering to the Forestry and Fisheries Guidelines (Forest Service 1991). The aspects of most concern are run-off of silt during ground preparation and run-off of phosphates applied to assist tree growth.

5.2.7 Co-operation with Other Agencies

The Board is also participating in the work of a committee established by the Local Authority to improve management of water quality on Lough Conn. Other agencies involved include the Department of the Marine, Central Fisheries Board, Environmental Research Unit, (Dept. of the Environment), Regional Water Laboratory, Bord na Mona (Peat Harvesting Board), Department of Forestry and Agricultural Advisory Service.

5.3 Current Situation

Following the above work, there has been a dramatic improvement in water quality on the lake with no algal blooms of any significance in 1991 or 1992.

6 CONCLUSION

Obviously, it is possible for Managers and Biologists, working together, to achieve results.

REFERENCES

- Anon 1986. Strategies for Management and Development of Inland Fisheries. Central Fisheries Board, Dublin, 50, 70-71.
- Anon 1992. The Future of the Moy Fisheries. N.W. Regional Fisheries Board, Ireland. 18-19.
- Beyerle G.B. and Williams L.E. 1986. Some observations of food selectivity by Northern pike in aquaria. *Trans. Am. Fish. Soc.* 97: 3-31.
- Champ W.S.T. 1990. Unpublished.
- Fitzmaurice P. 1983a. Some aspects of the biology and management of pike (*Essox Lucius L.*) stocks in Irish Fisheries. *J. Life Sci. R. Dubl. Soc.* 161-173.
- Fitzmaurice P. 1992. In press - The Management of Ireland's freshwater Ecosystems from a fisheries viewpoint.
- Forest Service 1991. Forestry and Fisheries Guidelines. Forest Service, Dept. of Energy, Dublin.
- Gargan P. and Caffrey J. Results of Preliminary Survey of the Rivers Deel and Owenmore, Co. Mayo with particular reference to peat siltation. Bord na Mona commissioned report. Bord na Mona, Dublin.
- Moriarty C. 1963. Food of Perch *Perca fluviatilis L.* and trout *Salmo trutta L.* in an Irish reservoir. *Proc. R. Ir. Acad.* 63B: 1-31.
- O'Grady M. 1990. A Review of Fish Stocks on Lough Conn. 1978-1990. The Future of the Moy Fisheries. N.W. Regional Fisheries Board, 1992. 80-82.
- O'Grady M. 1990. The development and management of Irish lake brown trout fisheries. *Proc. Inst. Fish. Mgmt.* 20th annual Study Course: 41-53.
- Thorne R. 1989. Unpublished.