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by

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Abstract

This paper represents the most comprehensive and detailed summary of the history of common carp *Cyprinus carpio* (L.) in Ireland to date. It charts the earliest known introductions of the species to Irish waters, the rise in popularity of recreational angling for the species from *c*. 1950 onwards, the work carried out to establish the species in Ireland and explains the primary causes of their more recent distribution increase. Much of the historical research material gathered on common carp in Irish waters, including the first recorded details of introduction, is presented here for the first time.

1 Introduction

1.1 History of the species

Common carp *Cyprinus carpio* (L.) (hereafter: carp) are one of the most widespread freshwater fish in the world, currently present on every continent, with the exception of Antarctica (Naylor *et al.,* 2000; Bakos, 2001). They are considered a very important aquaculture species, accounting for the third highest volume of the global freshwater fish production in 2008 at 2.9 million tonnes (FAO, 2010). Carp are also an increasingly popular and economically valuable recreational angling target worldwide (Arlinghaus & Mehner, 2003). The species originated in the Caspian Sea basin some two million years ago (Balon, 1995). Following the glacial retreats of the last ice age (Pleistocene, *c*. 11000 years ago), carp spread naturally into the Black and Aral Sea basins and subsequently, largely *via* human transfers, west across Europe and east into Asia (Clifford, 1992, 2002). Through predominantly European fish culture from the 13th and 14th centuries onwards the species became increasingly domesticated, forming many local strains, races and breeds (Balon, 1995; Bakos & Gorda, 1995). Unintentional artificial selection also resulted in different scale forms (or phenotypes) of carp, ranging from the typically fully-scaled 'common carp' to fish with less (scattered or mirror carp) or no scales (nude or leather carp) (Kirpichnikov, 1981). Domesticated carp quickly became decidedly different, both morphologically and biologically, from the original ancestral form, which is today only present in a few isolated populations, mostly along the Danube River basin (Balon, 1995, 2004).

1.2 Ireland's icthyofauna

Ireland has a depauperate freshwater icthyofauna compared to the UK and Continental Europe, owing to isolation and glaciation events during the Pleistocene epoch (Wheeler, 1977; Griffiths, 1997). As such, it is believed that all stenohaline (truly freshwater) species in Irish waters are introduced (Moriarty and Fitzmaurice, 2000; Fitzsimons and Igoe, 2004), although documented evidence of some species' introductions (e.g. Bream *Abramis brama* (L.), Rudd *Scardinius erythropthalmus* (L.)) is presently ambiguous. Molecular biogeography will ultimately confirm or disprove the colonisation histories of such species (Minchin, 2007). However, it is clear that carp are an introduced species in Irish freshwaters, and this paper presents comprehensive details and new findings on the history of the fish in Ireland from the earliest known introductions to the present day.

2 Materials and Methods

A review of the limited published material relating to carp in Ireland was conducted. In addition, a considerable amount of unpublished Inland Fisheries Trust (IFT), Central Fisheries Board (CFB) and Inland Fisheries Ireland (IFI) material and data was extensively examined. Informal and formal material published in numerous angling magazines from both the UK and Ireland was also reviewed. Former and current IFT/CFB/IFI employees who had gained experience or knowledge in working with carp previously were consulted, as were any relevant former and current angling club representatives, fishery owners and general stakeholders (e.g. landowners, fishery managers, independent anglers).

3 Results

3.1 Early introductions of carp to Ireland – 17th, 18th and 19th centuries

Written and archaeological evidence shows that carp were highly valued as a food source across Continental Europe, and to a lesser extent England, in later medieval times, *c*. 1300-1550 (Hoffman, 1995, 2005; Adamson, 2004). However, it appears that carp were not as prized in Ireland during this period, no doubt due to the islands extensive coastline and migratory fish stocks such as Atlantic salmon *Salmo salar* (L.) and eel *Anguilla anguilla* (L.) (Mac Giolla Phadraig, 1945; Roberts, 1951; Keenan, 2010). Although freshwater fishponds were constructed for sustenance throughout Ireland during Medieval times, mostly on Anglo-Norman manors and aristocratic lands, their occurrence was by no means common, probably due to the exploitation of rivers and sea (Went, 1955; Ludlow and Jameson, 2004; Murphy and O Conor, 2006; Keenan, 2010). Unlike fish such as pike *Esox lucius* (L.), there are no definitive records available at present, archaeological or written, which confirm the presence of carp in such ponds (Hamilton-Dyer, 2007). The first introductions of carp to England occurred in the late 14th or early 15th century, with their culture becoming well established across the country by the 1530s (Currie, 1991; Clifford, 1992; Balon, 1995). There are no definitive Irish records of carp until sometime after this period, although there is a vague reference and suggestion that carp were present and bred for food in Ireland possibly as far back as the 14th century (Lyons, 1942). Lyons (1942) provides an account of a possible Franciscan (monastic) carp breeding pond at Croan Lower, Clonmel, Co. Tipperary, which places a date of introduction sometime between the late 1300s and before 1540. Scharff (1916) theorised that carp were "probably introduced to Ireland many centuries ago by monks from the Continent". Although the role of monastic orders in the breeding of carp (throughout Europe as well as in England) is now thought to have been overemphasised (Hoffman, 1995), the belief of Scharff (1916) is possible, although unfortunately unsubstantiated. Nevertheless, it is possible that carp were also present in Ireland in the 14th, 15th or 16th centuries.

Rutty (1772) stated that carp were first introduced to Ireland during the reign of James I (1603-25), and that the fish was to be found (along with tench *Tinca tinca* (L.)) in the county of Dublin. Unfortunately, there are no exact details provided to validate this claim. Contrary to previous authors (Townshend, 1904; Went, 1950; Fitzmaurice, 1983), the earliest *recorded* introduction to Ireland actually occurred in 1626, not 1630 (as per Townshend, 1904) nor 1634 or 1640 (as per Went, 1950; Fitzmaurice, 1983). Richard Boyle, the first and 'Great' Earl of Cork, imported eight carp (along with 30 tench) from Amsterdam, Netherlands in January of that year (Grosart and Boyle, 1886b). These fish were obtained from Peter de Latfewr, an Amsterdam-based merchant with whom Boyle had extensive dealings, particularly in preserved fish and iron (Grosart and Boyle, 1886a-e; Townshend 1904). Records show that, on arrival in Youghal harbour, Co. Cork, many of the fish sent to Boyle from Amsterdam had died in transit (Grosart and Boyle, 1886b). The surviving fish were stocked into one of the Earl's fishponds at his residence of Lismore Castle, Co. Waterford.

Several years after this introduction the carp at Lismore had bred sufficiently to allow Boyle to supply his friends across Ireland with fish for their respective ponds, principally for food but also for ornamental purposes (Grosart and Boyle, 1886d-e; Townshend, 1904; Table 1). For example, in September 1634 the Lord President of

Munster, William St. Leger, received "20 younge carpes" (along with tench) from Lismore. This date was incorrectly taken by Went (1950) to have been Ireland's original introduction of carp. The destination of these fish could well have been Doneraile Court, Co. Cork, where the St. Leger family resided from the late 1500s onwards (Crowley, 1983). The well-stocked fish ponds at Doneraile were known to contain carp, perch *Perca fluviatilis* (L.) and pike in the mid-1600s to supply food (O' Donnell, (no date)). In September and October 1640 at least 120 "younge carpes" were sent from Lismore to various locations around the country (Grosart and Boyle, 1886d; Townshend, 1904; Went, 1950; Table 1), mostly Cork and quite probably Maynooth Castle, Co. Kildare, which was the residence of Boyle's fourth daughter Joan at this time (Little, 2002).

Details of other stockings of carp during this period (Table 1) are severely lacking and it is unclear if any further carp were supplied courtesy of Richard Boyle before his death in 1643. The fishponds at Lismore subsequently became derelict, and it was stated some time later by Grosart and Boyle (1886e) that "these reservoirs, in which were stored carp, tench and grayling [*Thymallus thymallus* (L.)] and other species of the finny tribe, hitherto unknown in Ireland, are now not kept up", with the fish eventually dying out. Other carp in Ireland originating from Lismore appear to have met the same fate.

Table 1. A summary of the earliest known recorded introductions and stockings of common carp *Cyprinus carpio* (L.) in Ireland as a result of an importation made by Richard Boyle

Date	Origin	Details	Destination	References
Jan 1626	Amsterdam, Netherlands	Eight carp imported from Mr. P. de Latfwer, an Amsterdam merchant	Lismore Castle, Co. Waterford	Grosart and Boyle, 1886b
Sept 1634	Lismore Castle	20 young carp sent to William St. Ledger, Lord President of Munster	Probably Doneraile Court, Co. Cork	Grosart and Boyle, 1886d
Oct 1634	Lismore Castle	40 young carp sent to James Butler, 12th Earl of Ormond	Ormond Castle, Carrick on Suir, Co. Waterford	Grosart and Boyle, 1886d
May 1635	Lismore Castle	Unknown number of young carp sent to Sir John Jepson	Mallow Castle, Co. Cork	Grosart and Boyle, 1886d
Sept 1640	Lismore Castle	40 young carp sent to Sir Phillip Percival	Kanturk Castle, Duhallow, Co. Cork	Grosart and Boyle, 1886e
Sept 1640	Lismore Castle	20 young carp sent to Sir Henry Warren, Second Remembrancer of the Exchequer	Grangebeg, Gilltown, Naas, Co. Kildare	Grosart and Boyle, 1886e; Manning, 2002
Sept 1640	Lismore Castle	20 young carp sent to Joan Boyle, Countess of Kildare, daughter of Richard Boyle	Maynooth Castle, Co. Kildare	Grosart and Boyle, 1886e
Oct 1640	Lismore Castle	40 young carp sent to Sir Phillip Percival	Kanturk Castle, Duhallow, Co. Cork	Grosart and Boyle, 1886e

There are numerous references to carp introductions to Irish waters throughout the 18th and 19th centuries. The stocking of carp (and other fish such as tench) for ornamental

(as opposed to food supply) purposes became more popular during this period (Reeves-Smith, 1997) and this cultural change can be largely, if not entirely, attributed to Richard Boyle (Grosart and Boyle, 1886e). Smith (1750) wrote that the River Awbeg, Co. Cork contained both carp and tench. These fish quite probably escaped from the Doneraile fishponds, which are bordered by the Awbeg. Smith (1750) also mentioned that a stretch of the Glanmire River, flowing through the Riverstown Demesne, Cork, was grated at both ends and stocked with carp and tench. He also noted the presence of carp in the "fine canals and water works" of Rochfortstown, west of Cork City. Although such records consistently fail to indicate the source of any fish, the majority, if not all, of the carp in the Cork area probably originated at one time from Lismore. According to an advertisement circulated by a Mr. Edward Deane in 1750, there were two large fishponds in the gardens of the House of Terenure, Dublin, which were stocked with carp and tench (Ball, 1903). The gardens of Leixlip Manor, Co. Kildare were said to contain a fish pond "stored with carp and tench, so very tame, that you may aloft take them with your hand" (Welsh, 1751). Rutty (1772) noted that carp were said to breed in "some loughs in the county of Wexford", the location of which are not currently known. Angel (1781) stated that carp were said to be "in great plenty" in the rivers Nore, Leitrim and Blackwater, in the counties Wexford, Waterford and Laois respectively. Again, as with the Awbeg, these carp probably escaped from fishponds adjacent to these rivers during flood events. Wilson (1786) and Seward (1795) both mention that the grounds of Belgrifin House, near Donnycarney, Dublin contained "several pieces of fine water, stored with tench and carp". The origins and exact details of the carp introduced to Ireland are, as already stated, very rarely given. One example is the importation that occurred *c*.1790, when 24 carp were imported from an unnamed source by William O' Brien, Lord Inchiquin, and stocked into Lough Inchiquin, Corofin, Co. Clare (Went, 1950). However, despite his hopes the carp did not appear again and a writer in 1815 (O' Gorman) noted their apparent absence from the lake (Went, 1950).

Tighe (1802) noted that carp and tench were present in the River Barrow (Co. Kilkenny) after they escaped due to the flooding of some fishponds at Low Grange, near Goresbridge, where they were presumably kept for food. Both Daniel (1807) and Windele (1849) wrote that carp were present in the Lakes of Killarney, and Finlay (1827) even wrote that "In these lakes there is good angling, and they possess a variety of excellent fish, particularly great abundance of salmon, carp, tench, trout, eels…", indicating regular or large initial stockings of fish. Wright *et al*. (1831) noted that the ponds of the Viceral or Royal Lodge, Phoenix Park (the modern day Áras an Uachtaráin) contained "two spacious ponds well stocked with trout, tench, carp and pike". Carp were also said to be stocked in the artificial canals and basins at Curraghmore House, Co. Waterford (Burke, 1855). Archer (1801) noted that a pond at Abbeville (modern Abbeyville), Malahide, Dublin "abounded with carp, tench and trout". Later, Thompson (1856) recorded that at the same pond, "some years ago… two or three-dozen carp" were captured, "the largest weighed 17 lbs. 8 oz. and the smallest 6 lbs." The lake at Abbeyville was constructed in 1792 and the origins of the carp are, again, uncertain. Thompson (1856) also stated that carp were present in the counties of Galway and Sligo, the locations of which are unclear at this present time.

Although carp were clearly introduced to many parts of Ireland throughout the 18th and 19th centuries, mostly to country houses and estates, they still failed to become as popular (as food or otherwise) as they did in England. In fact, G.J. Allman, Professor of Botany at the University of Dublin, stated in 1854 that "though now very abundant as an English pond fish", the carp was "by no means of such general occurrence in Ireland as it

deserves" (Allman, 1854). Although many stockings were initially successful, it is evident that the vast majority of these early Irish stocks died out, like for example the Lakes of Killarney (Fitzmaurice, 1983). Due to an almost complete absence of written stocking records, one can only postulate that the vast majority of carp introduced to Ireland in the 18th and 19th centuries came from England.

3.2 Carp in Ireland - 20th Century

Due largely to advances in preservation techniques, transport and the capture of wild fish (Moriarty, 1997; Foster and Chesney, 1997), as well as the Great Famine of 1845-1852 and the huge demographic, social and political changes that it brought about in Ireland (Donnely, 2001), carp were clearly imported and bred (for food) less frequently by the end of the 19th century. This resulted in only a few Irish carp populations surviving into the 1900s. One location was a lake at Kilcooley Abbey, near Thurles, Co. Tipperary, which was noted to contain carp when it was drained down for maintenance in 1904 (Roberts, 1961). The lake was constructed as a duck decoy *c*. 1780, an artificial water body designed specifically to aid in the hunting and capture of wildfowl (Heaton, 2001). Sadly, the exact details of introduction are presently unknown. However, it is likely that these carp were imported, as they were known to be of the more domesticated 'King carp' variety – carp strains with increased growth and reduced scale-cover, bred specifically for food in Continental Europe (Clifford, 1992). This introduction probably occurred in the later 1800s when 'King carp' began to appear in England from Europe in greater numbers (Clifford, 1992). Indeed, Roberts (1954) noted that "The original stocks of King carp, which were introduced into this country [Ireland] over 50 years ago, all came from the Continent". Roberts (1954) was almost certainly referring to the Kilcooley stocking, which places their introduction at around the turn of the 20th century at the latest.

In the early 1900s, Decoy Lake, on the Gurteen Estate near Kilsheelan, Co. Tipperary, was also stocked with 'King carp'. The lake was originally constructed and used as a duck decoy, like Kilcooley. The estate had been owned by the de la Poer family since Norman times but, according to early Ordnance Survey maps of the area, the lake site did not become completely flooded until the latter half of the 19th century. Initially the lake held (and was fished for) brown trout *Salmo trutta* (L.). The first recorded stockings of carp, according to the comprehensive diary of Count Edmond de la Poer, were in April and May 1903 (A. de la Poer, pers. comm.). It is highly probable that they were introduced to this shallow lake as a weed control measure. The exact details of the origins of these carp are unfortunately lacking but it is quite possible that they came from the nearby Kilcooley Abbey, as this is the only other known source of 'King carp' in Ireland during this period. Contrary to popular belief amongst Irish anglers, it does not appear that carp were directly imported from Europe to Decoy Lake.

Carp were also occasionally imported for ornamental purposes in the early 20th century, although to a lesser extent than the 17th and 18th centuries when this practice was more commonplace (Went 1950, 1964; Reeves-Smith, 1997). For example, in the late 1940s a small number of fish were introduced to a small, deep, ex-granite quarry pond in Dalkey, Dublin that was dug to provide building material for Dun Laoghaire Harbour (M. Kennedy, pers. comm.). These fish were said to be all fully-scaled (i.e. 'common' variety) and were most likely a more feral, less domesticated form of carp, mistakenly referred to as 'wild carp' by many anglers. Details of other importations of carp throughout the early 1900s

are sporadic and extremely vague, but there is little doubt that more took place than are currently accounted for.

3.3 Increasing Irish interest in carp as a sport fish

Carp distribution in Ireland was very different pre- and post-1950 (McCarthy and Kennedy, 1965; Fitzmaurice, 1983). Although there were only approximately nine known locations holding the species *c*. 1950 (Figure 1), more did undoubtedly exist. The origin of the carp in many of these locations still remains unclear. The incredibly localised distribution was mainly due to a comparative lack of interest in the recreational angling qualities of carp in Ireland. In contrast, England had many dedicated recreational carp fisheries and anglers by this time (Clifford, 1992). However, the attitude towards angling for 'coarse fish' (such as bream, tench and rudd) including carp, in Ireland began to change in the late 1940s as numerous guesthouses were set up for UK anglers, which began to visit Ireland in earnest around this period (Sinclair, 1963). One such guesthouse was established when Englishman and keen angler, the aforementioned John Roberts, moved to Co. Westmeath. Roberts began to actively source carp stocks in Ireland with the aim of providing sport fishing for his guests at his Ballinderry Lake near Moate. His efforts to locate the species were often, in his own words, "fruitless" and he concluded that carp were "a rare fish in Ireland" around this time (Roberts, 1961). This was also supported by McCarthy and Kennedy (1965) who noted "The carp is as yet a scarce and localised fish in Ireland". Any other authors commenting on Irish freshwaters at the time (*e.g.* Sinclair, 1963) also echoed these sentiments regarding the distribution of carp in the mid-20th Century.

Roberts eventually learned of the plentiful carp stocks in a small pool near Blackwater, Co. Wexford (referred to as Ned Carroll's or simply Blackwater Pond) in the late 1940s. The pond was thought to have contained carp since at least the 1920s or 30s (Hackett, 1984). Roberts succeeded in transferring some 40 fish to a weight of 3.6 - 4.5 kg (8 - 10 lbs.) from Blackwater Pond to Ballinderry Lake one day in 1947, although he still remained unsatisfied that these carp alone would support his fishery. Roberts noted that the carp from Blackwater, like the majority in Ireland at this time, were all fully scaled (*i.e.* 'Common' variety), largely feral and undomesticated and had poor growth when compared to the 'King carp' of England and continental Europe. Consequently, Roberts imported two-year old 'King carp', averaging 0.2 - 0.3 kg (8 - 10 oz.), from Germany in April 1951 and stocked them into Ballinderry (Roberts, 1961; J. Roberts pers. comm.). These carp were of the famous 'Galician' strain (Roberts, 1954), a fish renowned throughout Western Europe for longevity, fast growth and large ultimate sizes, and one which was widely introduced to the UK from 1925-1956 (Clifford, 1992, 2002).

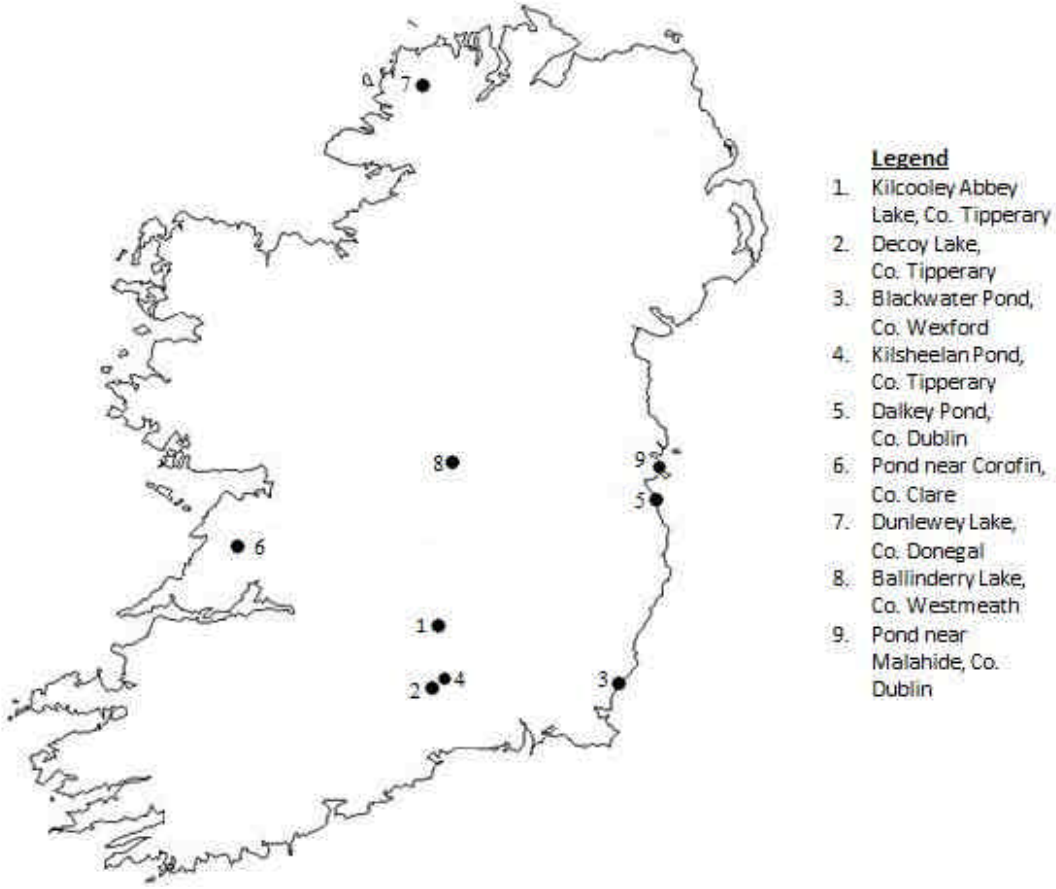

Figure 1. The known distribution of common carp *Cyprinus carpio* (L.) In Ireland *c*. 1950

While the 1951 Ballinderry stocking was very successful, with the fish reaching weights of up to 1.8 kg (4 lbs.) a year (which incidentally rivalled or even bettered many English angling waters at the time), Roberts was forced to abandon his plans for Ballinderry. This resulted from both personal illness and the commencement of the lake as a water supply reservoir, which resulted in drainage problems (Roberts, 1961). However, the 1951 introduction had far reaching implications for carp in Ireland. Not only did it help to raise awareness of carp as a sport fish amongst anglers but also, importantly, within the Inland Fisheries Trust (IFT), whose aim was to promote and develop Irish angling (Sinclair, 1963; McGrath *et al.,* 1965; Fitzmaurice, 1983; O Grady, 1989).

3.4 The Inland Fisheries Trust and carp - *c*. 1950 to 1980

Realising the rarity of carp in Irish waters, as well as the potential they had in attracting UK and Irish anglers alike, the IFT began to experiment with and investigate the species in the early 1950s. The first dealings the IFT had with carp were in April 1953 when permission was gained to remove adult fish from the private pond in Dalkey, Dublin and transport them to Bundoora Lake, Lough Gowna, Cavan as the nucleus of a breeding stock (Table 2; IFT, 1952-53; McCarthy and Kennedy, 1965). This particular site was one of the first in Ireland to be developed as an angling destination for visiting anglers. Although the owners managed to obtain carp, and later tench, through the IFT the venture did not succeed, largely due to the lack of suitable spawning conditions (M. Kennedy, pers. comm.)

One of the most important events in the recent history of carp in Ireland was the IFT's discovery of a breeding population of 'King carp' in a small, spring-fed pond at Kilsheelan, Co. Tipperary in 1954 (Figure 1). Sadly, it is not known when this shallow (averaging <0.5 m) pool of just a quarter of an acre was initially stocked with carp. It was reported by the IFT at the time that it "was stocked with carp many years ago but exact details are not available" (IFT, 1953-54). Analysis of scale samples taken in 1954 showed that the fish present were up to ten years old (McCarthy and Kennedy, 1965). This places the original stocking of carp possibly as far back as the mid-1940s, although the exact date of introduction remains unclear. However, it is certain that Kilsheelan contained carp prior to the importation made by Roberts in 1951. Kilsheelan has been rumoured, within the Irish angling community, to have received its original stock *via* fish imported by Roberts, but this appears to be incorrect. It is quite possible that the carp in Kilsheelan Pond and the nearby Decoy Lake share the same origins, although additional investigation is needed to confirm this.

On 16th September 1954, after contacting the IFT for advice, a Mr. Hugh McSweeny and other local anglers transferred small carp from Kilsheelan Pond to Cork Lough, Cork City (Table 2; Kelly, 1985; M. Kennedy, pers. comm.). These fish were introduced as a weed control measure to benefit the activities of the Lough Model Yacht Club. Incidentally, the introduction consisted of approximately one hundred Mirror and just two or three Common carp (Gough, 1975; Kelly, 1985). Three fish weighed 0.6 kg (1 lb. 8 oz.) and the remainder averaged 0.1 kg (4 oz.). This stocking was very successful with good growth and the establishment of a self-sustaining population and, in years to come, ensured Cork Lough became the premier carp angling water in Ireland.

After leaving Ballinderry, John Roberts bought Reynella House, near Bracklyn, Co. Westmeath and the-then 6.5 ha (16 acres) lake with the ambition of creating a sport angling water. To this end, he transferred small carp from Ballinderry in 1956 and also imported carp for a second time (Table 2; Roberts, 1961; Fitzmaurice, 1983). On this occasion the importation came from England, via Donald Leney and the Surrey Trout Farm, Nailsworth, Gloucester in December 1958 (C. Ball, pers. comm.). The origin of these fish, prior to England, remains unclear. Leney was well known for importing large numbers of small 'King carp' to England from a fish farm (Nederlandsch Heidemaatschappij) near Vaassen, Netherlands in the years 1925-1956 (Clifford, 2002). However, Leney stopped sourcing his carp from this farm as it ceased operations in 1956. It is possible that the 1958 Irish importation came from Belgium, where Leney continued to import carp for a short time afterwards (Clifford, 1992). Reynella did indeed become, for a short period, Ireland's premier carp angling water. However, it never produced an Irish record rod-caught carp as Roberts had hoped, largely due to the excessive weed growth which hampered angling efforts (M. Tudor, pers. comm.). At the time this record was held by John Roberts who, contrary to popular belief, caught his fish, a Mirror carp of 8.5 kg (18 lbs. 12 oz.), from Kilcooley (Abbey) Lake, Co. Tipperary on 6th June 1958, and not from Reynella (Roberts, 1961).

Table 2. Key common carp *Cyprinus carpio* (L.) stocking events that occurred during the time of the IFT *c*. 1950 - 1980

Date	Carp involved	Origin	Comments	Destination	Reference
April 1951	Unknown number of 2 year old fish, average 0.2-0.3 kg (8-10 oz)	Germany	Stocking carried out by John Roberts	Ballinderry Lake, Moate, Co. Westmeath	Roberts, 1961; J. Roberts, pers. comm.
April 1953	Five small adults 1.1-2.95 kg (2 lb 8 oz to 6 lb 8 oz)	Dalkey Pond, Malahide, Dublin	First IFT carp stocking	Bundoora Lake, Lough Gowna, Cavan	IFT, 1952-53; McCarthy and Kennedy, 1965
16th Sept 1954	100 Mirrors and 2-3 Commons, average 0.1 kg (4 oz)	Kilsheelan Pond, Kilsheelan, Co. Tipperary	Stocking carried out by Hugh Mc Sweeny and the Lough Model Yacht Club	Cork Lough, Cork City	Gough, 1975; Kelly, 1985; M. Kennedy, pers. comm.
Nov 1956	Unknown number of 6-month old fry	Ballinderry Lake, Moate, Co. Westmeath	Stocking carried out by John Roberts	Reynella Lake, Bracklyn, Co. Westmeath	Roberts, 1961; Fitzmaurice, 1983
Dec 1958	400 'King carp', 10 - 11.25 cm (4-4.5 inches)	Surrey Trout Farm, Nailsworth, England	Stocking carried out by John Roberts	Reynella Lake, Bracklyn, Co. Westmeath	C. Ball, pers. comm.
1976-77	Approx. 500 fry stocked	Cork Lough *via* Cullion Fish Farm	IFT stocking	Cork Lough, Cork City	Fitzmaurice, 1983; Kelly, 1985; M. Kennedy, pers. comm.
1975-77	585 fish (1975), 800 fish (1976-77) - all juveniles	Largely from Cork Lough. Possibly also Kilsheelan Pond?	IFT stocking	Gaulmoylestown Lake, Mullingar, Co. Westmeath	IFT 1975-76, IFT 1976-77, Fitzmaurice 1983, Whelan 1989

A list of other official carp stockings carried out by IFT during this period may be found in Fitzmaurice (1983) and Whelan (1989)

Largely under the influence of the late Noel Hackett, the IFT continued to experiment with carp stockings and breeding from the late 1950s and early 60s onwards. Without doubt the discovery of Kilsheelan Pond by the IFT had perhaps the greatest impact on carp distribution in Ireland. The carp in this pond spawned annually, unlike virtually all other known carp waters at the time (the only known exception being Blackwater Pond, Co. Wexford, Figure 1; McCarthy and Kennedy, 1965). As a result, the carp were very prolific and heavily environmentally-stunted, with all fish showing severe retardation of growth regardless of their age. Despite this, the pond represented the only freely available source of carp and was therefore used for official stocking and breeding purposes from the late 1950s to 1976, when the shallow pond dried up with a total loss of stock (Fitzmaurice, 1983). The vast majority of these early official stockings failed (Fitzmaurice, 1983; Whelan, 1989), with populations failing to establish.

Small numbers of carp were transferred from Kilsheelan to Roscrea Fish Farm as early as 1958 due to the “vulnerability of stock” in the shallow pond (M. Kennedy, pers. comm.). With the exception of one natural spawning in outdoor holding ponds in 1959 (IFT, 1959-60; McCarthy and Kennedy, 1965), the Kilsheelan carp held at Roscrea did not breed with any regularity (lack of suitable spawning temperatures; Fitzmaurice, 1983) and so the majority of the early IFT’s trial stockings were carried out using carp taken directly from Kilsheelan Pond itself, or at least fish held for a time at one of the Trust’s fish farms at Cullion, Mullingar, Co. Westmeath or Roscrea. Without this supply of carp from Kilsheelan Pond, it is doubtful if the IFT would have begun to experiment with and further investigate carp and their potential for angling opportunities.

Due to the lack of carp for use as brood stock, the IFT soon realised that artificial breeding was the only way to realistically establish carp in selected Irish waters. Initially the IFT's attempts at breeding carp for stocking purposes were tentative and largely unproductive. The primary reason, aside from broodstock acquirement, was the "technical difficulties encountered in the breeding of this particular species", i.e. the provision of suitable spawning temperatures of >20^{o}C (IFT, 1962-63; Fitzmaurice, 1983; Billard, 1999). Carp were "in very short supply" in these early years of the Trust (IFT, 1964-65). While carp from Kilsheelan Pond did indeed breed at Roscrea Fish Farm in 1959, and while construction work of "carp breeding ponds" began at Cullion in 1962 (IFT, 1962-63), it was not until 1971 that a dedicated effort was made to produce offspring artificially (IFT, 1971-72, Fitzmaurice 1983) (Table 2). Carp were still of very limited distribution at this time and securing supplies of carp for stocking purposes was therefore difficult. Importation of carp for stocking was considered undesirable due to potential disease risks (IFT, 1971-72).

In 1970, the aforementioned Dalkey Pond was filled in for development and the small numbers of resident carp were rescued by the IFT (IFT, 1971-72). These fish were held at Cullion Fish Farm, Mullingar. Coincidentally, the IFT moved their head office to Mobhi Boreen, Glasnevin, Dublin in 1970 where suitable facilities existed in which to spawn carp artificially. In 1971, the Dalkey carp were spawned under artificial conditions, although the number of offspring was limited, largely due to fertility problems (IFT, 1971-72; Fitzmaurice, 1983). These juveniles (and presumably the adults as well) were subsequently transferred to "one of the Trust's fish farms for future breeding purposes" (IFT, 1971-72). This would appear to have been Roscrea (M. Kennedy, pers. comm.) A more detailed account of this and other early spawning attempts can be found in Fitzmaurice (1983).

In 1974, another natural spawning of Kilsheelan Pond carp took place at Roscrea fish farm (Fitzmaurice, 1983), but again numbers of offspring were less than desired for stocking purposes. Successful artificial spawning's followed in 1975, when Noel Hackett managed to breed carp at Cullion fish farm, (J O Brien, pers. comm.) and Paddy Fitzmaurice, along with Hackett, bred fish at the IFT Glasnevin (Whelan, 1989). The fish used in both these experiments originated largely, if not entirely, from Cork Lough and offspring were stocked into Gaulmoylestown Lake, near Mullingar, Co. Westmeath in October that year (Table 2; IFT, 1975-76; Whelan, 1989). This particular introduction was highly successful, with good survival, growth and subsequent recruitment resulting in good angling opportunities (Whelan, 1989).

Brood stock were collected by the IFT again in 1976, from both Cork Lough and Kilsheelan Pond (prior to the latter drying up that year), and split between both the IFT's farms at Cullion and Roscrea. Spawning was successful at both farms and the broodstock were returned to their respective waters. A further 800 or so carp, derived from these spawning attempts, were stocked into Gaulmoylestown over the course of 1976-77, which also thrived (Table 2; IFT, 1976-77).

Some 500 fry derived from these same spawning events (1976 and 1977) were also stocked into Cork Lough (Table 2; Fitzmaurice, 1983; Kelly, 1985). It is thought that the fish were bred from Cork Lough parents held at Cullion Fish Farm (M. Kennedy pers. comm.). This proactive addition to the lake's stock of existing, specimen, carp was important, as it was well known at the time that, for one reason or another, the extant carp population in Cork Lough did not spawn successfully, or at least very infrequently (Hackett, 1974; Kelly, 1985). Therefore, with limited natural successful recruitment prior to this time,

the supplementary introduction (and good survival and growth; Cork Carp Anglers pers. comm.) of these juvenile fish ensured that future angling opportunities continued. Without this introduction it is uncertain if Cork Lough would have continued to be Irelands premier recreational carp fishery.

It is apparent that many of the early breeding attempts of carp were conducted in an almost impromptu manner. However, it must be understood that such efforts were largely, if not entirely, governed according to the supply of carp, not to mention finances and a general lack of experience with breeding coarse fish. Indeed, the IFT always cautiously referred to any carp breeding attempts or stockings as "experimental" (e.g. IFT, 1959-60; IFT, 1971-72; IFT, 1976-77). The IFT were, and had to be, very opportunistic in sourcing carp and so did not have the luxury of considering the potential growth, genetic strength or breeding conditions of the fish obtained. Carp were too rare a commodity to contemplate these issues and it should be remembered that their primary goal was to establish the species in selected waters which were not already noted for good angling opportunities for other species and which may also provide good spawning conditions (to enhance self-sustainability).

3.5 The Central Fisheries Board and carp – 1980 to late 1990s

By the time the IFT was replaced by the Central and Regional Fisheries Boards in October 1980, carp had become well established in certain waters, mostly in the Midlands and South, and more specifically in the Mullingar and Cork areas. In some instances this was due, at least in part, to unofficial movements of fish by anglers (Whelan, 1989). Such movements were not specifically in breach of any bye-law at the time, and were, therefore, not illegal, although they were actively discouraged by the Central Fisheries Board (CFB) (J. Caffrey, pers. comm.).

[The carp in Gaulmoylestown Lake, Mullingar (a small, shallow, eutrophic water) had begun to breed annually in the very late 1970s and, due to the drying up of Kilsheelan Pond in 1976 and the general lack of brood stock, this small Westmeath lake became the primary source of carp for stocking purposes nationwide, as well as a renowned angling location (Whelan, 1989). Due to an increasing interest in carp angling, the CFB continued to experiment with their artificial breeding programme in the early 1980s. For example, in 1982 some 140 carp weighing from 1.3 - 2.2 kg (3 - 5 lbs.) were taken from Gaulmoylestown for use as broodstock (CFB, 1982). The fish were artificially stripped and the resulting fry were reared in ponds at both the CFB Head Office, Glasnevin and Cullion Fish Farm. The offspring were released into selected waters in 1983 (Table 3).

In 1984, 14 adult carp up to 4.5 kg (10 lbs.) and 29 smaller fish were again collected from Gaulmoylestown for use as broodstock (Roche, 1984a). These were transferred to the nearby Cullion Fish Farm. For the first time, Herbert Park, Dublin, was also used in 1984 as a source of carp brood stock (Roche, 1984b). The pond was initially stocked with carp from one of the CFB's fish farms in 1978 and the fish reproduced well once mature (Roche, 1984b; Fitzmaurice, 1983). In total, 40 fish (25 adults and 15 juveniles) were removed from the Dublin City pond to facilitate the carp spawning programme and were transferred to Glasnevin. As in previous times, it can be seen during the 1980s that carp continued to be obtained from whichever water bodies were deemed to have a large and surplus, healthy, spawning stock. For official purposes this essentially meant Gaulmoylestown or, very occasionally, Cork Lough.

It wasn't until June 1990 that further efforts were made to spawn carp artificially at the CFB's office in Glasnevin when some 243 carp were removed from Gaulmoylestown before being transferred to the nearby Cullion fish farm. The fish were subsequently released into sections of the Grand and Royal Canals, as part of a stocking programme for the waterways (Caffrey *et al.,* 1991). A small number of fish were also spawned artificially at Glasnevin in early July 1990. As with most previous attempts, the numbers of resulting offspring were quite low and their growth in particular was very poor. The experiment was terminated in November 1990 before the juvenile carp were also stocked into the Grand Canal (B. Connelly, pers. comm.; Table 3).

Table 3. Summary of successful artificial spawning attempts with common carp *Cyprinus carpio* (L.) carried out by IFT/CFB 1970-90

Date	Location	Total Carp used	Origin	Comments	Destination	Reference
1971	Glasnevin	5 females & 12 males	Dalkey Pond	Spawning successful but numbers of offspring low	Roscrea Fish Farm	IFT, 1971-72; Fitzmaurice, 1983; M. Kennedy, pers. comm.
1974	Cullion?	Unknown	Cork Lough	Spawning successful, minimum of 400 offspring produced	Cork Lough	Kelly, 1985; M. Kennedy, pers. comm.
1975	Glasnevin & Cullion	Unknown	Cork Lough	Spawnings successful at both locations	Various waters, including Gaulmoylestown Lake, Co. Westmeath	IFT, 1975-76; Whelan, 1989; J O Brien, pers. comm.
1976	Cullion & Roscrea	Unknown	Cork Lough & Kilsheelan Pond	Spawning successful at both locations, broodstock returned to respective waters	Various waters, including Gaulmoylestown Lake, Co. Westmeath; some fish withheld	IFT, 1976-77
1982	Glasnevin & Cullion	Unknown number chosen and used from total of 140 carp, weight 1.3-2.2 kg	Gaulmoylestown Lake	Spawning successful, fry reared at Glasnevin & Cullion	Offspring released into various waters in 1983	CFB, 1982
1984	Cullion	Unknown number chosen and used from total of 14 adults to 4.5 kg & 29 smaller fish	Gaulmoylestown Lake	-	Various waters	Roche, 1984a
	Glasnevin	25 adults & 15 juvenilles	Herbert Park, Dublin	-	Various waters	Roche, 1984b
1990	Cullion	2 females & 4 males	Gaulmoylestown Lake	Spawning successful but numbers of offspring low and growth poor	Stocked into Grand Canal in November 1990	Caffrey *et al.,* 1991

Not included are the three natural spawnings of Kilsheelan Pond carp at Roscrea Fish Farm in 1959, 1974 and 1976.

Only the successful artificial spawning attempts are listed, there were many failed attempts
e.g. Glasnevin 1971 (Fitzmaurice, 1983), Cullion 1982-84 (W. Roche, pers. comm.)

With such limited and inconsistent success at artificial rearing (Table 3) it was difficult to create new angling waters, with many stockings failing to establish (i.e. survive and/or reproduce successfully to a sufficient degree in order to create viable angling waters). Consequently, the CFB noted around this time that "There are growing demands for additional carp fisheries" (CFB, 1988-1989). Carp distribution and angling nationwide continued to increase gradually towards the end of the last century (Figure 2), largely due to

the angling influences of England where the popularity of recreational carp angling increased significantly and consistently from the 1970s onwards (Moon & Souter, 1994; Hickley, 1998). However, it must be noted that this expansion in the Irish distribution of carp was often due to unofficial movements of fish by anglers and not necessarily through official stockings (Whelan, 1989; J. Caffrey, pers. comm.). Despite this, public carp fisheries were still very limited and were still largely based around the Cork and Mullingar areas.

3.6 Late 1990s onwards

By the late 1990s the demand for carp stocks for angling had increased so much that it became viable to set up the first Irish commercial recreational fisheries, based around carp angling. Among the first such amenities were Anglegrove Fishery, Woodford, Co. Galway (1993; incidentally, not initially a commercial venture), Stephenstown Pond, Knockbridge, Co. Louth (1996), Lakelands Fishery, Roosky, Co. Roscommon (1999) and Oaklands Lake, New Ross, Co. Waterford (1999). Three of these fisheries were initially stocked with carp from Gaulmoylestown Lake, Co. Westmeath whilst the latter received fish from Decoy Lake, Co. Tipperary.

The demand for carp for stocking completely outstripped supply around this period, with the number of possible broodstock waters essentially limited to Gaulmoylestown Lake or Cork Lough - both public venues where healthy, self-sustaining populations of adult carp existed. Ballincollig Reservoir, Co. Cork, a small lake stocked unofficially by anglers, was also used for broodstock purposes on several occasions. With such a limited number of locations where surplus stocks are available, due primarily to a lack of suitable spawning conditions, establishing the species in Irish waters has always been problematic. Therefore, in order to satisfy the increasing demand for carp for angling purposes, a dedicated coarse fish (including carp) breeding programme was initiated at Roscrea Fish Farm in late 2000 and 12 broodstock were transferred from Gaulmoylestown Lake (CFB, 2001; J. Cowen, pers. comm.; Figure 2) . Incidentally, this was the first time that carp had been held at Roscrea in some ten years (J. Cowen, pers. comm.). The facility was established under the Tourism Angling Measures (TAM) of the Operational Programme for Tourism (1994-99) funded by the EU (CFB, 2001). The aims of the facility were to augment wild fish stocks in the creation of new coarse fish waters and to replenish the stocks impacted by fish mortalities or stock collapses, thus providing the angling industry with the ability to cater for fish stock balance and niche angling markets (IFI, pers. comm.).

In January 2001, carp were successfully spawned artificially for the first time at the new facility (CFB, 2001). Over the following few years tens of thousands of carp were produced at this facility and stocked into public and private landlocked fisheries across Ireland. This lead to a large increase in the distribution of the species nationally. For example, in 2001 alone, some 100,000 carp fry were stocked from Roscrea into selected water bodies (CFB, 2001). In subsequent years the demand was for fewer, larger fish and this became the focus of the programme. The production of carp at Roscrea ceased in April 2008 for financial reasons (J. Caffrey, pers. comm.).

In 1998, Decoy Lake in Co. Tipperary became available to anglers for the first time through the now defunct Irish Carp Society, although access was limited to a small syndicate of members. The lake and estate had previously been private. Due to reservations among anglers regarding the growth rate, size and the excessive numbers of carp present in the lake at the time, there was an organised destocking of juvenile carp in the years 1999-2001 (Caffrey and Hoey, 2001; Figure 2) This was carried out by the Central

and Southern Regional Fishery Boards in an effort to reduce the overall fish biomass and improve specimen carp angling (Caffrey and Hoey, 2001). Many of these juvenile carp were stocked to designated waters throughout the country. For example, some 65,000 small fish were removed from Decoy in 1999 and 2000 alone (Caffrey and Hoey, 2001). Carp from Decoy Lake were never used in any artificial breeding attempts or official stockings prior to this time (C. Nolan pers. comm., J. Cowen, pers. comm.). Any such reports were simply borne out of the confusion caused by the close proximity of Kilsheelan Pond and Decoy Lake, and the fact that Decoy is also often referred to as Kilsheelan Lake (as per Caffrey and Hoey, 2001). Incidentally, this was the first time that carp of Decoy Lake origin became in any way widespread in Irish waters.

The popularity of carp as a sport fish amongst Irish anglers continued to increase throughout the early 2000s (O' Boyle, 2004; Figure 2). There was also a growing, widespread dissatisfaction amongst Irish anglers regarding the growth and growth potential of existing carp stocks, which, for reasons beyond the scope of this paper, compared unfavourably with the situation in the U.K and continental Europe. In an effort to address this demand to have larger carp available to anglers in Ireland, a consignment of 2.2 tonnes of carp was imported through Simon Horton of Bigot Pisciculture, Miré, France (currently of Pisciculture Horton) in December 2003.These fish were stocked into Decoy Lake, Co. Tipperary (53 fish up to 12.9 kg (28 lbs. 8 oz.)) and Maynooth Fisheries (now Lyreen Angling Centre), Co. Kildare (253 fish up to 14.97 kg (33 lbs.)), both recreational carp fisheries (Figure 2). The fish were sourced independently of the regulatory authorities, by anglers working in conjunction with the Gurteen Estate and Maynooth Fisheries. It should be noted that these fish did not have prior import approval from the Department of Communications, Marine and Natural Resources (DCMNR), the regulatory authority at the time, nor were they accompanied by the mandatory fish health certification required under the E.C. Council Directive 91/67/EEC (the predecessor of the current Fish Health Directive 2006/88/EC) (F. Geoghegan, pers. comm.). The importation was therefore illegal under E.U. and national legislation. Consequently, the DCMNR imposed restrictions on the receiving sites for a two-year period, whereby a health screening programme was implemented and all movements of live fish from the sites were prohibited (MI, pers. comm.). Incidentally, both sites were given health clearance following this period and the imported fish were allowed to remain *in-situ* and available to anglers. In addition, this importation was contrary to the recommendations made by the CFB (now IFI), and was the first recorded in Ireland for stocking purposes since 1974 (see Fitzmaurice, 1983).

In recent years (2008, 2009 and 2011), again due to the lack of a national carp supply and an increasing demand from carp anglers for an acknowledged fast-growing carp strain, a number of approved (by IFI and MI) shipments of disease-free carp have been imported from Neil Hardy Aquatica Ltd., Surrey, England, U.K (Figure 2). These introductions were for recreational angling purposes and the fish were stocked, following agreement with IFI, into a small number of designated private fisheries throughout Ireland (T. Campbell, pers. comm.; J. Caffrey, pers. comm.). In compliance with IFI policy on carp stocking, these carp were only introduced into landlocked waters either known to contain the species (designated carp waters) or artificial landlocked waters where the possible ecological impact of carp would be minimal and limited to that specific location (J. Caffrey, pers. comm.).

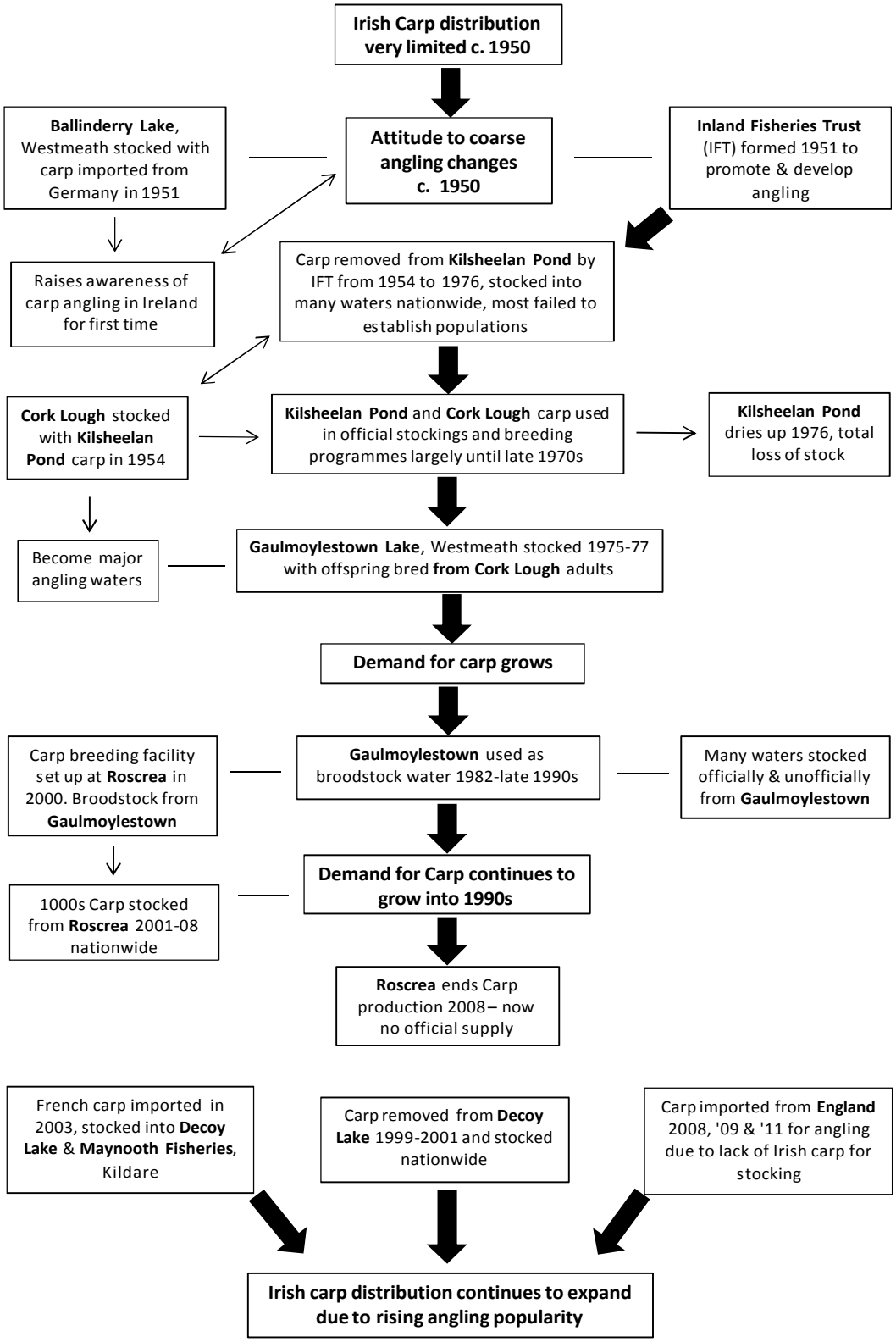

Figure 2. A flow diagram summarising the history of common carp *Cyprinus carpio* (L.) in Ireland from *c*. 1950 – present. Events are largely recreational angling-driven. Only the key events are given

4 Discussion and Conclusions

Although this paper represents the most comprehensive account of the history of carp in Ireland to date, it is by no means definitive. Sadly, it is highly unlikely that there will ever be a complete description, due to the hugely fragmented, largely unrecorded and unpublished nature of details regarding carp in Ireland, with most of the information available having been taken from either people's personal memories or anecdotal form. It is therefore inevitable that there are at least some inaccuracies and omissions contained within this paper. As a direct result, further research into the historical aspect of the species in Irish waters will continue.

However, based on historical evidence it is apparent that carp have been present in Ireland for approximately 400 years. It is the authors' opinion that the species was very likely to have been introduced long before Richard Boyle's importation in 1626, especially given their use (albeit over-estimated) as food by monastic and ecclesiastical settlements (Currie, 1991; Balon, 1995). Given the fact that carp and their culture were well established in neighbouring England by the 1530s only adds to this supposition.

Carp in Ireland are presently largely descended or derived from importations that occurred in the early to mid-1900s and their subsequent stockings. Without the endeavour and pioneering efforts of the late John Roberts, the late Noel Hackett and other Inland Fisheries Trust staff, it is doubtful that the species would have become a permanent part of the Irish freshwater fish fauna and, in turn, an increasingly important coarse angling asset to Ireland.

Although carp is a non-native species in Ireland, it has become established in many waters, with numerous self-sustaining populations present (Macklin and Brazier, 2011, unpublished data). Carp in Ireland have little ecological influence outside the limited number of landlocked waters in which they reside. Nevertheless, despite the increasing interest in carp as a sport fish in Ireland, and the significant local socio-economic benefits such fisheries are capable of producing (Arlinghaus and Mehner, 2003; Vilizzi *et al*., 2011), careful scientifically-based management is still required regarding future stockings of carp in Irish waters. This is necessary in order to protect and preserve sensitive freshwater environments and other recreationally and economically important fish species such as tench, bream, and rudd. The correct choice of suitable waters based on ecological and physio-chemical assessments is also vital in encouraging the improved growth of carp for angling purposes. To this end, research on Irish carp biology, ecology, distribution and genetics is currently being undertaken at University College Cork (UCC) to improve the overall knowledge of the species in Irish waters, to verify the information gleaned from historical investigations and to inform carp management in Irish waters.

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