

Historical Pond-Breeding of Cyprinids in Sweden and Finland

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This chapter describes and analyses the history of pond-breeding of fish in Sweden and Finland (which was an integral part of Sweden until 1809) from late medieval times until around 1900.¹ Very little is known about the history of aquaculture in Sweden and Finland. Most published overviews are superficial. There are very few studies based on sources and hardly anything has been written by historians using modern methods and source criticism. We are therefore uncovering a long, although now broken, tradition of fish cultivation in ponds which has left scant traces in the written record or the physical environment.

We need to make some clear distinctions about types of aquaculture since much confusion arises from writers not differentiating among natural fish populations in natural or artificial ponds, unselective capture for stocking or storage of wild fish, selective stock and grow operations, and human management of breeding and species-specific stocking and artificial feeding or nutrient management. We deal mainly with the last case. We do not include marine aquaculture, which is a very recent phenomenon in Scandinavia.

The overall purpose of our chapter is to discuss how fish kept in fishponds have been introduced, farmed and spread in Sweden and Finland in early

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modern times. We want to explore the importance of fishponds and the use of related fish production for food by elucidating their economic, social and religious importance with an emphasis on the historical importance of certain species, in particular crucian carp (*Carassius carassius* (L.)). We have identified several socio-cultural domains during the time period of interest: monastic fishponds in the late medieval times, aristocratic fishponds associated with castles and manors from the late medieval times until at least the early nineteenth century, ponds associated with rectories in the seventeenth and eighteenth century, and urban ponds from the seventeenth century to the nineteenth century. The transformation of the ponds to other functions will also be discussed briefly, as well as attempts to revive cyprinid fishpond production at the turn of the twentieth century.

This chapter aims to illuminate a complex problem that requires a variety of historical methods. We have already stressed that we are dealing with a historical phenomenon that has left few written or physical traces. It is therefore a difficult problem to examine. The study relies on disparate source material. Our source material consists primarily of physical remnants (fishponds), current fish populations which are likely to descend from the former pond production, and onomastic material (such as ichtyonyms and toponyms). One essential source category is the geometrical cadastral maps. Such maps have been shown to be a useful source for studying garden culture, orchards, mills and other economic activities on farms and manors in former times (Nilsson 2010). We have also tried to track down relevant narrative sources such as zoological literature, memoires, historical overviews of manors, provisions lists, old cookbooks and old menus (Svanberg 2010). In Sweden, very few archaeozoological remains from medieval or early modern ponds have been analysed so far (Jonsson 1984, Bonow and Svanberg 2015; cf. Nordeide and Hufthammer 2009).

Early evidence

From the thirteenth century to 1809, Sweden and Finland were united as one country. It therefore seems sensible to discuss the occurrence of artificial fishponds in both Finland and Sweden in the same chapter. The provinces of Scania, Blekinge, Halland and Bohuslän did not become part of Sweden until the Treaty of Roskilde in 1658. We do not know when artificial fish production in ponds was introduced in the Swedish empire. Primitive keeping of fish in more or less artificial settings, which might be termed a kind of rudimentary proto-aquaculture, has probably always occurred

(Bunting and Little 2005). Until rather recently it was a common practice among the peasantry in Finland and Sweden to keep fish in wells dug primarily to provide drinking water. Many small animals thrived in these wells and in order to keep them clean, eel (*Anguilla anguilla* L.) or Northern pike (*Esox lucidus* L.), known as *kaivohauki* ‘well pike’ in Finnish, were introduced (Sarmela 1994: 52; Svanberg 2000: 91). In Denmark, farmers used the crucian carp for the same purpose (Brøndegaard 1985: 227). This practice is probably very ancient, but has of course nothing to do with economic production of fish. However, it is an interesting example of primitive fish-keeping.

Keeping and stocking fish in man-made ponds is also an old habit. Fish caught by fishermen could be brought to the pond or put in an enclosed area to keep them alive while waiting for later consumption. Fishponds, and simply, ordinary ponds, are mentioned on several occasions in documents from the thirteenth to fifteenth centuries, but it is not possible from these sources to determine if they were used for aquaculture. It seems more likely that they were used merely for stocking fish. These kinds of ponds are mentioned occasionally in documents kept in *Diplomatarium Suecanum*; for instance, in 1241 in Västra Göinge (Skåne) and in 1436 in Sköllersta parish (Närke) as well as in Vaglö (Östergötland) (Wallin 1962: 231; Wiktorsson 1978: 149). An *eel pond* is actually mentioned at Djuråker in Öja parish, Småland, in 1476, which was of course used for stocking eels (Almquist 1938: 167). Millponds are also mentioned relatively often in Swedish medieval sources. However, we do not know if they were also used for breeding fish. Millponds for keeping fish are mentioned from other parts of Europe though (Bunting and Little 2005: 122).

We have two records of lay landowners constructing fishponds from the Swedish area in the fifteenth century. The Charles Chronicle (*Karlskrönikan*) mentions that the military governor Karl Knutsson (Charles, later king of Sweden) commissioned *kroppa damber* (‘crucian carp ponds’) at Vyborg Castle, a Swedish-built medieval fortress on the Carelian isthmus, in 1446 (Klemming 1866: 245). This first example is constructed at a non-religious locality (the chronicler actually claims that this was the first time a fishpond was founded in the country). Somewhere in northern Gotland a *rwde dam* (‘crucian carp pond’) was established around 1485 by Privy Council Ivar Axelsson Tott. According to an account book for 1485–87, he bought the fish from local fishermen on the island (Melfors 1991: 173). These two records are among the few examples from written sources in our area of profane fishponds made for the breeding and rearing of fish.

Monastic pond-culture

There is a widespread but uncorroborated opinion that aquaculture was introduced in Scandinavia with the monastic culture. Using ponds to cultivate fish has, according to some European scholars, been important to the monastery economy, not least to readily provide access to fish during the religious period of 150 days when eating meat was forbidden (Fagan 2007: 130–135). Fish was in all likelihood an important part of the diet in the monasteries. Medieval fish bones of cod and related species prove that marine resources were also a source of protein in abbeys in Sweden and elsewhere (Lepiksaar 1965).

The Cistercian Order (*Ordo Cisterciensis*) is sometimes said to have spread aquaculture to northern Europe, but no evidence supporting this claim is available. Fish certainly played an important role in their diet, but did they really breed fish in ponds, or were the millponds and other kinds of ponds only used for stocking fish? (Johansson 1964: 64–65, 91). Sources of documentary evidence are rare. The monasteries at Alvastra, Gudhem, Gudsberga, Herrevad, Julita, Nydala, Riseberga, Roma, Solberga, Varnhem and Vreta (the latter founded by the Benedictine Order) belonged to the Cistercian Order in Sweden. There are preserved fishponds at the ruins at Alvastra Abbey that actually still contain crucian carp populations, but we do not know when these ponds were constructed. The contemporary ponds at Alvastra are assumed to have been reconstructed in more recent times (Bonow and Svanberg in press).

Very few reliable sources about monastic fishponds exist from Sweden. Certainly, some traces of fishponds are known from Swedish monasteries. From Vadstena Abbey, which belonged to the Bridgettine Order, *rudho damber* ‘crucian carp ponds’ obviously used for raising fish are mentioned in 1470 and 1517 (Bernström 1969: 441). Similarly, there is still a partially retained pond at the Franciscan convent (*Ordo Fratrum Minorum*) in Söderköping. Other Franciscan convents with fishponds are located in Linköping. The fishpond excavated at Nylödöse might originally have been part of the Franciscan convent (1473–c. 1520), or, as has been suggested by historian Rune Ekre, from an earlier abbey belonging to the Dominicans. Fishponds are also mentioned at the monasteries at Askeby Abbey, Skänninge Abbey, Gudhem Abbey and All Saints Abbey in Lund (Bonow and Svanberg 2016).

A review of the Swedish monasteries would certainly provide further evidence. Archaeological finds from these monastic fishponds are also few,

so hardly any archaeozoological material has been studied (Lepiksaar 1969). One interesting document is the instruction provided by Bishop Hans Brask in Linköping to the state overseer at the Bishop's House, where he was ordered to have a special supervision of *rudadammom* (the crucian carp pond), from where fish were sold on the market. Traces of this pond can still be seen near the cathedral (Bonow and Svanberg 2016).

Some insight into the late medieval monastic fishponds in Sweden is given by Petrus Magni (Peder Månsson) in his manuscript *Bondakonst*, written in Late Old Swedish in about 1520. His name appears for the first time in 1499, when he was chaplain and also the school principal in Vadstena. He was ordained a monk brother in Vadstena Monastery of the Bridgettine Order. In his manuscript from 1520, Petrus dedicates a whole chapter to pond fish culture. The text is to some extent based on Petrus's own experience and provides rare knowledge of pond-breeding of crucian carp and other cyprinids in Scandinavia in late medieval times (Svanberg and Cios 2014).

Fish taxa kept in the ponds

Which species were raised in early ponds in Sweden and Finland? As has been shown above, the most common fish kept and bred in ponds already during medieval times was the crucian carp (*Carassius carassius* (L.)). It has a pond form (*dammruda* 'pond crucian carp') that was earlier recognized as a distinct subspecies or variety. The pond variety was said to be rare in Finland (Lilljeborg 1891; Malmgren 1863: 39).

The ponds were usually called 'crucian carp ponds' (*ruddammar*) on maps; hence we assume that they were primarily used for raising this fish species. The species was well-suited to the Swedish climate and could survive without oxygen through the long winter months in the frozen ponds. It can be transported over long distances even in very trying conditions. In 1756, Anders Tidström (1978: 67) observed in Gothenburg that they could be transported intact over a whole day by placing them in a tub embedded in sphagnum moss (*Sphagnum*). The crucian carp's capacity to survive for long periods without water makes it unique among Swedish fish taxa.

Coupled with their capacity to also survive over winter, frozen in the ice, this makes the crucian carp population persistent even in relatively small pools of water. The crucian carp seems to have been used as a pond fish mainly in northern and north-eastern Europe. In Late Old Swedish it was known as **kroppa* (1446, still in 1520) for this species is known in a late medieval text (Söderwall 1953: 1253; Granlund 1983: 275). The term *Kråppedam* was used for

a ‘crucian carp pond’ in Råda parish in Västergötland according to a cadastral map from 1653, and it is recorded still in the nineteenth century as a local folk name for crucian carp in the same province (Rietz 1862: 357). It is also known from Småland (Lindner 1867: 89). *Kroppe* (recorded since 1554) has also been used in Denmark (Brøndegaard 1985: 227).

The fish is otherwise known as *ruda* in Swedish, but also by its German name *karussa* in south-western Sweden (Skåne, Blekinge, Halland and Bohuslän) and Gotland (recorded since 1556, see Almquist 1911: 586; Sorbonius 1845/1693: 101; Tidström 1891/1756: 50, Kornhall 1968: 103). This ichthyonym is a modification of Middle Low German *karusse*, which is probably of Baltic origin; akin to Lithuanian *karušis* ‘carp’ (Hellquist 1939: 658). It is known as *ruutana* and *kouri* in Finnish (Malmgren 1863: 38; cf. Kendla 2000: 185 for an etymological discussion of the latter). The use of Danish and Low German loan words as ichthyonyms may indicate that the fish was actually imported and therefore did not originate from local wild populations.

In his zoological lectures from the 1740s, Linnaeus states that the crucian carp was easy to cultivate in ponds and modest in its needs (Lönnerberg 1913: 191). Raising crucian carp in fishponds seems to be a Northern European adaptation to the aquaculture practice that was initially developed in central Europe during medieval times. It is also mentioned in both Poland and Denmark in late medieval times (Hofmeister 2004; Makowiecki 2008: 763).

Another species mentioned in medieval sources (Petrus Magni) as a pond fish is the tench (*Tinca tinca* (L.)), known as *swthara* in Late Old Swedish (Granlund 1983: 275), in Modern Swedish *sutare*, locally *sutter* (Värmland), and in many places as *lindare* (as *lijnnare* from 1612), in the southern part of Sweden also as *skomakare* (Bernström 1972; Svanberg 2000: 266). Wild populations exist in the southern and eastern parts of Sweden (Lilljeborg 1891). It was also known for its capacity to survive transport over long distances. Some were also of the opinion that its presence in fishponds promoted the well-being of other species like the crucian carp (Rothof 1762: 503; Fischerström 1785: 195, 233; Lönnerberg 1913: 191; cf. Brøndegaard 1985: 228). However, it does not seem to have been a popular food fish in Sweden during early modern times. It was actually not until the end of the nineteenth century that it became more popular as a pond fish for consumption (Nordqvist 1922: 588).

There is a common but erroneous viewpoint that fishpond culture was introduced in order to breed common carp (*Cyprinus carpio* L.) in Scandinavia. Some of the historical ponds are therefore nowadays wrongly referred to as

‘carp ponds’ in tourist brochures and popular history writing. On the contrary, this fish taxon has been relatively scarce as a pond fish in Sweden. The species is originally from the Danubian Basin in south-east Europe and spread to Central Europe for fish farming purposes during late medieval times, but was introduced to the Nordic countries more recently (Hoffmann 1995; Makowiecki 2008). The transition of the species from being an exploited captive to a truly domesticated animal took place in the twelfth century (Benecke 2000: 496; Balon 2004: 4–11). We do not have any persuasive evidence for its presence in Sweden until the seventeenth century and since then it has never been common. In 1555, Magnus quite correctly underscores this point when he states that the common carp are missing from Nordic waters (Book 20:23). The Swedish word *karp* (known in its plural from *carpor* from an imported recipe from around 1500) is a German loan word (Bernström 1963: 308). There is a historical view that carp were introduced to Scania, which at that time belonged to Denmark, by the minister and Steward of the Realm Peder Oxe (1520–1575) in around 1560 (Nilsson 1855: 287; Juhlin-Dannfelt 1925: 426). However, as the zoologist Torsten Gislén has shown, this is not supported by any historical sources (Gislén and Kauri 1959: 251–253). In the 1570s there was an attempt to import carp to Kalmar Castle. Carp ponds (*Carpe dammer*) are explicitly mentioned that year. The king gave an order for workers to dig crucian carp ponds (*som kunne graffwe Rude och Carpe Dammer*) in the castle grounds. Two years later, Arvid Swan is ordered to import live carp from Germany (*‘belangendes [...] någre leffwendes karper han ifrå Tydzlandh [...], förskaffe skall’*) (Granlund 1876: 86, 98). Some sources mention carp in Sweden during the next century, for instance in 1660. Carp are also mentioned in the royal ponds in Stockholm in 1683 and 1684, when the carp died because they could not survive the winter (Lundberg and Svanberg 2010: 155). The species has never fully adapted to the Swedish climate and it was a continuing problem that carp kept in ponds died during the winter, as Carl Hallenborg (1913) commented from Scania in the 1750s. It was not until the eighteenth century that there is convincing evidence that they are cultivated on some large estates in southern Sweden (Linnaeus 1751: 224; Rothof 1762: 232). However, as Fischerström (1761) observes, common carp are still rare in Halland manor ponds. Towards the end of the century (the 1790s), however, there are reports that they had been introduced at Dömostorp Manor and Vallen Castle in Våxtorp, Halland (Osbeck 1996: 64). Contrary to Fischerström’s (1761) assertion, Osbeck (1996: 64) claims that 180 common carp were introduced at Våxtorp in the 1680s or even earlier. However, there is no source that confirms that the introduced carp survived and were

cultivated in any ongoing way. In the eighteenth century, most carp consumed in Stockholm were imported from Danzig (Lönnberg 1913: 191). In Finland carp were not introduced until the 1860s (Piironen 1994: 70).

On royal estates, and possibly some manors owned by the aristocracy, attempts were made to breed the small but tasty stone loach (*Barbatula barbatula*). It seems to have been introduced as early as the 1680s. Its old Swedish name *smerling*, which is used in the historical sources, shows its German origin. The records indicate that stone loach were kept in ponds in The Royal Game Park (Kungl. Djurgården) in Stockholm at that time. They were first kept in a separate pond but later relocated to another pond and cohabited with carp. This is confirmed by an annotation from 1683, which indicates that three men were paid for two days' work to relocate stone loach from their pond to the carp pond in The Royal Game Park. Stone loach had a reputation for being easy to digest and suitable for sensitive stomachs. This species of fish was therefore a popular dish among the royals. Sixty years later, in 1740, King Frederick I is said to have released stone loach in ponds at Ulriksdal Royal Castle. The fish were possibly imported from the king's native Germany to be eaten as a delicacy (Lundberg and Svanberg 2010). The cultivation of stone loach is also mentioned in relation to the royal fishponds in Denmark in the mid-seventeenth century (Hofmeister 2005: 76).

Some fish taxa may have also been kept by the royals and the social elite for non-consumptive purposes such as ornamentation. For instance, sterlet (*Acipenser ruthenus* L.) and European weather loach (*Misgurnus fossilis* L.) were kept in ponds in the Royal Gardens in the 1740s for this purpose (Lundberg and Svanberg 2016). There were even attempts to introduce them in Lake Mälaren (Bernström 1947). Keeping of ornamental fish, such as the gold varieties of the cyprinids known as goldfish (*Carassius auratus* L.), golden orfe (*Leuciscus idus* L.) and golden tench, in ponds to enhance garden aesthetics is a more recent trend. Ornamental fish of these kinds are not mentioned in Swedish sources until the eighteenth and nineteenth centuries (Lilljeborg 1891: 158–160; Svanberg 2007: 76–77).

Historically, cyprinids have been kept in ponds for economic reasons, but never with any success for aquaculture. There are occasional recorded sources of keeping roach (*Rutilus rutilus* L.), asp (*Aspius aspius* L.) and other species like perch (*Perca fluviatilis* L.) and pike (*Esox lucius* L.) in ponds. In all likelihood these refer to the stocking of these species rather than breeding them in the ponds. For instance, a special pond established for asp in Uppsala is mentioned in 1590 (Bernström 1969: 442). We should also remember that Schroderus (1640: 167) refers to *rudammsfiskar* ('crucian carp

pondfish’), a label he uses collectively and therefore imprecisely to refer to carp, ide, asp, pike and crucian carp. These were probably fish taxa that could be stocked in a crucian carp pond.

After the reformation

There is a widespread myth that the Protestant Reformation in the 1520s and 1530s was in itself a threat to fish farming in Sweden. However, we cannot see any evidence to support this view of a decline in aquaculture in early modern times. On the contrary, the evidence indicates that pond culture not only survived but was also extended to other environments during the sixteenth and seventeenth centuries. This, however, is a record from 1548 of the existence of a crucian carp pond in a monastery in Vadstena. The oldest written information we have about fishponds from Alvastra also dates back to 1548. This is after the Reformation and the source indicates that the Royal Court paid 25 *marker* in salary to soldiers to maintain the crucian carp ponds there, which indicates that Gustav Vasa supported fish farming in the country. Three ponds can be seen maps from 1640 and 1691 of the former site of Alvastra Abbey. On a map of Askeby from 1776, at least one fishpond is visible. It is not clear whether the fishponds discussed above were used for raising fish and it is also not known if they are the same as the ones that were used before the abbeys were abandoned.

Pond cultivation in castle and monastery grounds that had been established in Sweden during late medieval times lived on as a form of production after the Reformation and even spread to other socio-cultural domains. Scattered data in the sources shows that several castles had crucian carp ponds in the sixteenth century. A crucian carp pond at the castle in Turku is mentioned in 1552 (Gardberg 1959: 76). When King Gustav Vasa visited Örebro in August 1554, the castle was repaired, a new kitchen built and a crucian carp pond cleared (Nordström and Dahlander 1913: 31). His son John III of Sweden tried with foreign help to construct carp ponds at Kalmar Castle in the 1570s (Silfverstolpe 1876:86). In 1570, a crucian carp pond was constructed at the Royal Castle in Uppsala (Bonow and Svanberg 2012: 134, 140). Fish production in ponds seems to have been commonplace in the grounds of Swedish castles during the sixteenth and seventeenth centuries (Nilsson 1939).

In the early 1690s, Åke Claesson Rålamb published his encyclopaedic *Adelig Öfvning*, which is a kind of handbook on agronomy, among other topics. The intended readership of the handbook was young noblemen. In his

book, he also describes the construction of crucian carp dams, stressing for instance the fact that the pond must have a breathing hole in winter and that it should be maintained with horse manure (Rålamb 1691: 96). Isaacus Erics (1576–1650), a priest in Stenby parish in Östergötland, translated a German handbook on gardening and household economy, which promoted the expansion of crucian carp ponds (Erici 1683: 169). In his magnificent baroque epos, *Guds Werk och Hwila* ('God's work and rest') from 1685, the Bishop of Linköping, Haqvin Spegel, advocates fishponds with carp and crucian carp (Spegel 1998).

There are numerous data from the early seventeenth century on crucian carp ponds in castle grounds (Ellenius 1967: 69). The accounts from Gripsholm Castle in Mariefred mention that in 1620 two crucian carp fishponds existed in the large castle garden (Bonow and Svanberg 2011). A crucian carp pond was built on the Skälby Estate in Kalmar County in the 1640s (Hofrén 1937: 120–121). Svartsjö Palace on the island of Färingsö in Lake Mälaren still has a preserved crucian carp pond that probably dates back to the seventeenth century. There is an unverified story that a crucian carp pond was constructed on the roof of Bogesund Castle in Uppland in the 1640s (Nisser 1927: 31). A 1674 map of Skokloster Castle located on Lake Mälaren shows a crucian carp pond beside the old hop-garden (Ellenius 1967: 70).

At Visingsborg Castle on Visingsö, an island in Lake Vättern, Count Per Brahe the Younger (1602–1680) constructed crucian carp ponds, which can be seen on cadastral maps. Fishponds are also reported from several locations in Finland, including Jacob de la Gardie's estate in the town of Nykarleby where his wife Ebba Brahe raised crucian carp (Huldén 1957). Astronomer Tycho Brahe (1546–1601) also had a large number of ponds on the island of Ven in the late sixteenth century. The island was still under Danish rule at that time (Nilsson 1939).

Fishponds in manorial culture

Interest in pond fish continued into the Age of Liberty (1718–1772) in Sweden, as many reports from the provinces show (e.g. Barchaeus 1924: 60; Fischerström 1761: 266; Fischerström 1768: 195; Osbeck 1996: 65). There appear to have been fishponds at numerous manors in southern Sweden and in Finland during the eighteenth century (Schwerin 1932: 157). Lindgren (1939: 60) suggests that watermill dams might have also functioned as fishponds. There is nothing, however, in the sources that support this opinion.

In Scania we can observe an interest in large-scale fish farming in the eighteenth century on some of the larger estates. In *Skånska resa* (1751), Carl Linnaeus described the estate of Marsvinsholm in Scania where there were 99 ponds, including one on a roof, containing common carp and crucian carp. What significance crucian carp ponds had for supplying estate households has not been investigated but these systems of ponds were obviously built in order to sell fish. During his tour of Scania in 1749, Linnaeus noted several estates, including Marsvinsholm, Vrams Gunnarstorp and Lärkesholm, where there were fishponds that grew crucian carp and common carp. He also provides us with some production figures (Linnaeus 1751: 224, 256, 378–381).

The Trolleholm Castle in Scania is interesting in this context because surviving local archival documentation provides detailed data on crucian carp production. During the seventeenth century several fishponds were constructed, both near the main building and distributed throughout the grounds of the estate. In addition to the carp production records, a diary was maintained with details of the estimated number of fish fry released into the ponds. These data gives us insights into the magnitude of production in the ponds. In 1799 there were about twenty fishponds on Trolleholm. In the Albergssdammen, 270 crucian carp were caught on 28 June and 2 July 1806. On 24 August 1808, 236 crucian carp fry were released and on 28 August 1815, 100 larger crucian carp (and a number of pike) were caught. The Albergssdammen was stocked with crucian carp on 8 September 1800. On 10 October 1804, no fewer than 160 crucian carp and three tench were caught and on 17 July 1809 twenty crucian carp and three pike were caught. On 23 July 1810 the catch was 48 crucian carp, one large tench and several small fish. We also know that Trolleholm had special wardens for the management of fishponds. Fishing in the ponds at Trolleholm is recorded for the last time in 1817 (Bonde-Trolle 1905: 146–147).

Rectory fishponds

One important discovery in our investigation is the presence of crucian carp stocked fishponds at the rectories. This has been observed before, but never investigated in detail (Arvastsson 1977: 41). It was obviously not just rich landowners who raised crucian carp in ponds for household consumption. Why this clerical aquaculture developed is not clear, but it has nothing to do with religious fasting, a custom that was abandoned after the Reformation (Baelter 1783: 209–211). The fishponds were probably part of the rectory

economy, of which little is known. It seems to have been a widespread pattern in some parts of southern and eastern Sweden (Bonow and Svanberg 2014).

While source material is a little ambiguous on this point, clerical pond cultivation of crucian carp was established in the seventeenth century. Cadastral maps from 1640 show virtually no ponds in parsonages, which may indicate that pond farming had not yet been established, but the lack of ponds could also be attributed to survey issues. There are only a few instances of fishponds appearing on the early cadastral maps, for example, in 1641 as part of the Stora Tuna Rectory in Dalecarlia (Bonow and Svanberg 2011).

The construction of ponds for fish farming in vicarages is infrequently mentioned in the sources. Peder Berger, a vicar in Runtuna Parish in Södermanland, hired two Dalecarlian men in 1662 to dig a crucian carp pond. In 1679, at Dunkers Vicarage in the same province, a crucian carp pond was constructed in the garden (Flinck 1996: 123).

We know that there were crucian carp ponds in vicarages in several provinces in the Swedish countryside from the late seventeenth through to the eighteenth centuries, but preserved maps and surveying documents distinguish two important clusters in Scania and Östergötland. We have also found evidence of fishponds on the cadastral maps in rectories in Uppland and Västergötland as well as in Småland, Närke, Dalecarlia and Gotland (e.g. Vall Parish, which still has a pond stocked with crucian carp). It is possible that further research will provide a more nuanced view, but here we must content ourselves with a brief presentation of the clerical crucian carp ponds in Scania and Östergötland (Bonow and Svanberg 2011, 2012: 137–139).

There is rich data available on Östergötland in the eastern part of Sweden. One important source is the cadastral maps from the late seventeenth and the first half of the eighteenth centuries. They give us information about pond locations. Approximately twenty vicarages had crucian carp ponds during this period. We can distinguish two areas where crucian carp ponds seem to have been common. These are around the great lakes, Vättern and Roxen, and the neighbouring towns of Söderköping, Norrköping and Linköping, where priests had constructed fishponds either in their gardens or in adjacent areas (Bonow and Svanberg 2011).

Parsonage garden culture emerged in the late seventeenth century and Söderköping's rectory is considered to be one of the first in the area to have a large garden. It was recommended that priests establish kitchen gardens with vegetables and herbs, orchards and if water was available, construct crucian carp ponds (Cnattingius 1932). Östergötland archival sources show that crucian carp ponds had ceased to be constructed by 1750. They slowly

disappear from the maps from 1800 onwards. Today only a few of these ponds remain, some of which contain crucian carp, for example, Styrstad Parish (Bonow and Svanberg 2011).

In Scania we find many crucian carp ponds in rectory grounds in the late seventeenth century (Arvastsson 1977: 41). Olof Bertelsson Aquilonius (1630–1684), a vicar of Löderup Parish, shows that clerical fish farming could have quite significant economic importance. He was probably more of an entrepreneur than a spiritual adviser. He had a private boat with which he transported crucian and other carp from his ponds to sell in Copenhagen (Cavallin 1857: 82).

A survey of Gladsax Parish in 1699 shows crucian carp ponds located on the outfields were already defunct at the time of the mapping. The six ponds depicted on the 1699 map had all belonged to the Royal Palace. Within the village, the rectory still had two ponds in use (Nilsson 1939). A crucian carp pond was still operational there in the 1756, when Anders Tidström passed through the village. He stated that a problem with ponds on the outfields was that someone could steal the fish, but also that waterfowl could bring fry of predatory fish (pike) that would threaten the fish stock. In the middle of the village, fishponds could however give an output and could also be emptied to take advantage of the manure that was allowed to drain into the ponds (Tidström 1891: 50). The 1693 Veberöd cadastral map shows that 10 of the twenty-five homesteads in the village had crucian carp ponds on their property. Unlike other parts of Sweden, where ponds disappeared during the eighteenth century, they persisted in Scania and some even became the subject of litigations in the land reforms of the nineteenth century (Nilsson 1939).

Urban fishponds

A very interesting finding in our search for fishponds in Sweden is the occurrence of crucian carp ponds in or near cities during the eighteenth and nineteenth centuries. Urban traces of carp ponds are found in city areas, for example, in Stockholm and Uppsala, and in street names, for example, in Stockholm, Eskilstuna, Gävle, Mariefred and Lindesberg, throughout Sweden. In Gävle, for example, there is Ruddammsgatan, which is a street located in the area where a crucian carp pond was located at the beginning of the eighteenth century. Crucian carp ponds and other fishponds are also mentioned in historical sources from Eskilstuna, Arboga, Örebro, Uppsala, Norrköping, Linköping, Varberg and Ronneby. Many of these fishponds are shown on cadastral maps. Abraham Hülphers (1783:83–84) refers to the pond in

Eskilstuna as a ‘crucian carp pond’ in 1783, and it was still inhabited with fish in the 1920s. Other urban crucian carp ponds also existed at Almrothska ängen and at Gästis in Eskilstuna, but they were gone by 1920. Traces of an urban crucian carp pond in Arboga were still apparent in the late nineteenth century (Bonow and Svanberg 2015).

Ruddammen is a well-known area in Östermalm in Stockholm. At the beginning of the 1700s there were several fishponds here and the largest of them belonged to the inn-owner Ingemar Frodholm on his property Ingermarshov. Women also owned crucian carp ponds. From the early seventeenth century there is evidence that a widow named Elsa Hoffman owned property with a crucian carp pond on the outskirts of Örebro (Lenander Fällström 1987: 111). Other instances of urban crucian carp ponds included Marieberg on Kungsholmen (Wikström 1840: 14) and Uppsala, where there were several crucian carp ponds, one of which is still remembered through Rudan, the name of the city block in the centre of Uppsala (Bonow and Svanberg 2012: 141). Carl Linnaeus also mentions the existence of crucian carp ponds and fishponds in Uppsala. For instance, several of the ponds in Uppsala were owned by a J.D. Fick (Linnaeus 1755; Triewald 1746). The old royal fishpond in Uppsala was an urban pond in the eighteenth century (Linnaeus 1899: 36).

According to the zoologist Sven Nilsson (1855: 295), there were still numerous crucian carp ponds in Lund up until the 1850s. In the 1760s, a complex of fishponds for breeding carp was built on Helgonabacken in Lund. Remains of one of these ponds are still discernible in the park outside the university library. The extent of crucian carp ponds in towns, their ownership and management still remains to be explored.

A special case of urban ponds were those created for the purposes of breeding medicinal leeches (*Hirudo medicinalis* L.). There are several instances of such ponds (Malm 1863: 175). The street name *Igeldammsgatan* in Kungsholmen in central Stockholm reminds us of such ponds. In 1835, no fewer than 40,000 leeches were introduced in the ponds, which were run by Apotekarsocieten in Stockholm. Leeches were used in large numbers in eighteenth and nineteenth century medicine (800,000 in Sweden and 200,000 in Finland in 1850) and to satisfy this high demand they were farmed in ponds (Linnaeus 1764; Whitaker et al. 2004). Ponds for breeding leeches still existed on Hisingen, near Gothenburg, in the early twentieth century (Ahlbäck 2006).

Construction and management of ponds

The oldest Scandinavian fishponds at monasteries are said to have been constructed with the continental carp ponds as models (Rasmussen 1959). Very little is known about the construction of these fishponds in Sweden. A pond was excavated at Lödöse Convent in 1964, but no analyses have yet been published (Ekre 2007). This is also true of fishponds in other socio-cultural domains. We can still see some of them at a number of manors and rectories, but they have been changed several times since they were actually used for aquaculture. Some handbooks give detailed information on how to construct ponds. Probably the most detailed was published by Carl Henrik König, with a chapter on various kinds of ponds (König 1757: 126–131). Schultze (1778: 205–224) also gives many interesting details on how to construct ponds.

More interesting is the material edited by Carl Knutberg in 1768, based on descriptions sent to the Swedish Academy of Sciences. He differentiates between ponds for the breeding and rearing of fish, which he named *plantér-dammar* ('rearing ponds'), and ponds for just holding captured fish for later consumption, which he called *sump-dammar* ('nurse-ponds') (Knutberg 1768). A commentator at the time, Schultze (1778: 217) was of the view that all kinds of fish could be kept in the latter kind.

There were obviously two kinds of ponds for breeding fish. The first type was located in orchards. Several of these ponds have survived, although they are now used for other purposes. It was more common, however, at least at the manors, to dam a brook or a small stream. These kinds of ponds have not survived until today. Knutberg (1768) gives many details about the construction of ponds. Some other sources also provide details about the construction of the ponds. A document from 1658 describes how a beam (*rud-dammsbalk*) was used as a partition in the ponds (Hultman 1913: 236). As far as we know, no technical or archaeological studies have, been made of those old ponds that still endure in Sweden.

A cadastral map from Höja Manor in Uppland shows that trees were planted around the pond in order to give shade (Ulväng 2009: 80). Such planted trees can also be seen on several cadastral maps from elsewhere. The planting of willow or other broad-leaved trees to give shade to fishponds is also recommended by Knutberg. The trees also helped to protect the fish from birds of prey (Knutberg 1768: 174).

Details regarding pond cultivation are sparse. The growth of the crucian carp in ponds had already been discussed by Olof Rudbeckius in the seven-

teenth century (Rudbeck 1947: 252). Knutberg (1768) discusses the construction of ponds. Tiburtz Tiburtius (1706–1787), a priest from Vreta Parish, conducted extensive experiments with fish farming in his parish. Furthermore, he discussed his experience in an article published by the Swedish Academy of Sciences in 1768. He owned several custom-dug ponds stocked with crucian carp and tench, but he was apparently dissatisfied with the production outcome and so instead sought to develop a fish farm system of natural lakes (Tiburtius 1768).

The large fish farm at Marsvinsholm Castle in Skåne is described in some detail in Linnaeus's 1751 travelogue. At the time of Linnaeus's visit there were almost forty ponds at Marsvinsholm, which were all stocked with common carp and crucian carp. However, a few years earlier there were as many as 99 ponds in the grounds, as well as a pond on the roof, which was made of lead. Further details about the construction and management of fishponds in Lärkesholm are also described by Linnaeus. These two fish farms were the largest in Sweden at the time of Linnaeus' visit in 1751 (Linnaeus 1751: 254, 370–380).

Handbooks also contain information regarding crucian carp ponds. Lorens Wolter Rothof stresses that they should be kept in nutrient-rich ponds and that the ponds be landscaped to allow the manure to flow into them. He suggested that under these conditions the fish would grow large and multiply quickly. According to Rothof (1762: 391), each square fathom (= 3.17 m²) could yield a barrel of crucian carp per month. In less nutrient-rich water, however, the fish reproduced slowly and were only a few inches long (Rothof 1762: 391). The use of manure-laced waste water seems to have been an important part of fishpond culture in Sweden (Tidström 1891/1756: 50; Fischerström 1785: 196; Barchaeus 1924: 60).

Johan Fischerström, a prolific economic writer, gave an interesting insight into crucian carp breeding in ponds in 1761 with the following advice on how to tend them: "They love clay and grass floor. Newly dug ponds ought either to be clothed with weed or sown with oats. There should be a mother-pond, and a couple of other ponds for males only. It is customary to throw balls, made from mash and blue clay, into the ponds. Thick sour milk makes them particularly fatty and delicious" (Fischerström 1761: 266).

This quote shows that they had detailed knowledge of all the different aspects of cultivation in crucian carp ponds. Another piece of advice was to loosen "the scale on either side, then cut out a piece of the tail, which pro-

motes their growth” (Fischerström 1761: 266). At the time there were apparently strong views on how the ponds should be constructed, about feeding regimes and how the fish could be manipulated to stimulate growth.

Carl Ulrik Ekström (1831: 199), a vicar in Södermanland in the early 1830s, described how crucian carp were harvested from ponds with the help of hand nets or fish traps baited with eggshells. On one occasion he had observed a specially-made dragnet for harvesting crucian carp from ponds. In the Scandian ponds, the crucian carp was caught with a dragnet or a special wicker basket drawn along the bottom of the pond (Nilsson 1855: 296). A seventeenth century document from Finland mentions a fish trap for capturing crucian carp in ponds (Hultman 1913: 236).

According to eighteenth century authors, the presence of smooth newts (*Lissotriton vulgaris* (L.)) and leeches (*Piscicola geometra* (L.)) was a problem in fishponds. Both leeches and newts were accused by Mårten Triewald, Carl Linnaeus and Johan Fischerström, among others, of causing considerable damage to the crucian carp stock in fishponds. Linnaeus suggested adding some salt to the water to drive the newts away, something that Triewald, who had a thriving crucian carp pond at Elisabethsberg on Kungsholmen in Stockholm, confirmed as a successful strategy during his own experiments (Triewald 1746; Cederlöf 1766: 17; Fischerström 1785: 236).

Otters were also seen to be a problem for fishpond owners, and manors kept dogs to keep them away (Knutberg 1768: 178). Beavers and water voles are also mentioned as pond pests (Schultze 1778: 215). Pikes that were accidentally introduced into the fishponds were also dangerous (Linnaeus 1751: 379).

Farmed fish for food

The Swedish Royal Kitchen and the high nobility were also fond of crucian carp for the table. We have a few scattered reports from the Royal Kitchen in the 16th century which mention various dishes like ‘fried crucian carp with apples’ (*Steckta karusser och äplor* 1556), ‘crucian carp pâté’ (*Charutze Pasteijer* 1600) and others. Dishes of carp and milt of carp are also mentioned, including carp-tongue, which is actually a fat-like formation in the throat of the fish, which was used for various delicacies in the early seventeenth century such as carp-tongue pâté (*Pastei af Karpetungor*) and carp soup (c.f. Rålamb 1690: 120, 107; Anonymous 1730: 21).

Crucian carp were served at manors and rectories in the eighteenth and nineteenth centuries. It was easy to harvest from a well-managed pond and the

carp provided a good meal (Reuterholm 1909: 137; Lönnqvist 1993: 20–21; Roberg 1951: 201). At Möllershof manor in Mäntsälä in Finland there is clear evidence that crucian carp were served in connection with the Möllersvärd family's funerals. Among the many dishes recorded as being served, we also find that crucian carp were served as part of the very elaborate and ritualized funeral dinner gourmet dishes (Hausen 1915: 184). In 1653, at a wedding in a bishop's household in Jutland in Denmark, no fewer than 2,380 crucian carp were served as part of the celebrations (Möller 1871: 8b).

In the cookbooks from the seventeenth and eighteenth century, we find considerable evidence of crucian carp as a valued part of the culinary culture. In her *Hjelpreda i Hushållningen För Unga Fruentimber* Kajsa Warg, probably Sweden's most famous cookbook author, gives several recipes containing crucian carp (Warg 1755: 292). Other popular cookbooks also have various carp recipes (e.g. Björklund 1808: 109 and Hollberg 1896: 129). However, we do not know anything about how crucian carp were utilized within the rectories' kitchens.

In his fishing guide of 1778, Samuel Th. Schultze described the flesh of carp as "nice and tasty" (Schulze 1778: 79). The crucian carp's popularity as a fish for the table lasted well into the nineteenth century. Ichthyologist and Vicar C. U. Ekström praises its flavour and consistency (Ekström 1831: 199). As late as 1855 the zoologist Sven Nilsson claimed that, "It is considered a very tasty fish" (p. 293), and describes how it was boiled and served with white cream sauce flavoured with horseradish (Nilsson 1855: 293). Some authors also commend the flesh of the tench. It was said to be white, juicy, satisfying and easy to digest (Bergius 1787: 314; Fischerström 1785: 195).

The end of an era

Carl Linnaeus, always alert to ideas that could benefit the country's economy, was obviously enthusiastic about the future of aquaculture in Sweden. In his journey to Scania, published in 1751, he was clearly inspired by the carp and crucian carp cultivation he had studied in Lärkesholm. He was so impressed that he thought that carp cultivation could also have a future in other parts of Sweden. His thoughts about this are clearly expressed in the following statement urging remedial action on this matter: "Our Nation should think again about this matter, which so far at least up in the country, has not engendered the respect it deserves, then so wonderful opportunities for the fish once could be enough valued to its satisfaction, and the mountainous

landscape, which gives smaller grains, could replace the loss with fish” (Linnaeus 1751: 379).

Linnaeus’s observations in Scania led to an increase in interest in aquaculture among authorities and economic writers. A doctoral thesis on Scania carp ponds, under the presidium of Claes Bleckert Trozelius, was defended by Olof Cederlöf at Lund University in 1766. Although based mainly on Linnaeus’s writings it gives some insights into how aquaculture was perceived by economists at the time (Cederlöf 1766). The same year, the Swedish Academy of Sciences described the best way of constructing ponds for fish farming (Lindroth 1967). Four manuscripts on the issue were prepared, edited and published by the industrious Carl Knutberg in 1768 (Knutberg 1768). Also a royal decree, issued in November 14, 1766, requested Sweden’s governors to encourage the construction of fishponds for the cultivation of asp, carp, crucian carp and ide (Kungl. Maj 1766). Agronomic economy writers published descriptions of how to construct fishponds and raise common carp and crucian carp with texts based mainly on Linnaeus’s travelogue from 1751 (Carleson 1768). As early as 1760 a Professorship of Practical Economy (Borgström Professorship) was established at Uppsala University with the task of lecturing not only on gardening and hunting but also on fishery and aquaculture (Lindroth 1975).

However, all these efforts were in vain. The economic margins of aquaculture were too small, so fish farms never fulfilled their great promise. Linnaeus’s enthusiasm notwithstanding, the cultivation of crucian carp, common carp, tench and other fish that occurred in the grounds of castles, manors and rectories and in some cities had already faded by the early nineteenth century. This is related to the Agrarian Revolution where more and more land was cultivated to increase agricultural productivity. Fish prices were also very low during this period. As a result, it was deemed not to be worth the effort to cultivate fish for food (Gadd 2011; Nordqvist 1922: 590).

During this time remnant ponds were filled in (which is sometimes indicated on the cadastral maps with names like Ruddamsängen ‘the crucian carp pond meadow’) or were turned into ornamental ponds, especially when the English landscape parks became fashionable in Sweden after around the 1780s. Sometimes the old fishponds would be used to keep ducks or, in the grounds of the larger mansions, swans. The mute swan (*Cygnus olor*) was distributed as an ornamental bird on estates during the second half of the eighteenth century and became an important element of park landscapes (Flinck 1996: 76, 86; Svanberg 2007: 86–87).

A renewed interest in aquaculture

We can discern a renewed interest in aquaculture in the mid-1800s when Baron Gustaf C. Cederström was commissioned by the Royal Academy of Agriculture in 1856 to travel around the country taking stock of aquaculture for fish production in the Swedish countryside. On his journeys, he found small initiatives here and there. Of particular interest to us is that he describes the presence of isolated, old, overgrown fishponds that had recently been restored at James Steffenburg's property, Lövnäs, near Falun and at a castle near Tidaholm. Experiments with new pond fish species such as asp, perch, bream and ide occurred among some enterprising households at mansions and on estates but he did not encounter any functioning crucian carp ponds. The cultivation of carp for subsistence purposes, which had been present at the seventeenth and eighteenth century rectories and manor houses, was however gone (Cederström 1857: 13).

Influenced by French success with trout breeding, in 1858 Cederström initiated an aquacultural experiment together with John Lenning (1819–1879) at Holmen near Norrköping. At about the same time, Carl Byström introduced aquaculture in Jämtland (BiSOS 1861: 20). These and subsequent forays were focused on farming salmonids (Schött 1914: 394–395). Handbooks in aquaculture were also published (Norbäck 1884; Trybom 1885).

The late nineteenth century saw a commercialised resurgence of the cyprinid fishpond culture. In 1879, Carl Wendt, a landlord, established extensive carp farming on Gustafsborg Estate in Perstorp in Kristianstad County. In all he constructed 63 ponds over 356 acres. Wendt was originally from Germany and his ideas were probably derived from his experience there. Some of his neighbours were also inspired by his fish farm initiative and founded their own ponds. His son Wilhelm Wendt moved to Lammhult in Småland where he founded a fish farm stocked with common carp and tench (Trybom 1885; Nordquist 1922: 591). In 1890, the state authorities founded a fish farm called Fiskodlings- och sötvattensbiologisk anstalt at Finspång in Östergötland headed by a biologist and ichthyologist named Rudolf Lundberg (1844–1902) (Anonymous 1892). MP Carl M. Peterson provides a vivid description of his rotation strategy when cultivating crucian carp and tench in Småland in the early twentieth century (Edling 1910: 22).

Under the leadership of fisheries commissioner Oscar Nordqvist, Södra Sveriges fiskeriförening founded an experimental and model farm for aquaculture in Aneboda (Småland) in 1906. These ponds, managed by state authorities, were primarily stocked with carp and tench. These ponds are still

operational today and they produce carp for a variety of commercial purposes, including common carp for recreational fishing, ornamental Koi for garden ponds, and grass carp (*Ctenopharyngodon idella* (Valenciennes)), for weed and algae control in ponds, for example at Kolmården Zoo. With state support, educational programmes in fish farming were held in schools at Ängelsberg in Västmanland, where fish farming of rainbow trout (*Oncorhynchus mykiss* (Walbaum)) was first practised in Sweden, and in Aneboda (Ahlbäck 2006). The Swedish Rural Economy and Agricultural Societies (*hushållningssällskapen*) participated in these educational efforts (Larsson 1922; Alm 1927).

In total, in 1916, there were fish-farms on almost 1,700 hectares in the counties of Kristianstad, Kronoberg, Malmöhus and Halland in southern Sweden. Two thirds of the area used for fish farming was located in Kristianstad County. Fish farms were also beginning to be established elsewhere in the country. These were mostly salmonid fish farms in Örebro and Jämtland counties. However, there were also quite extensive farms in Gimo-Österby, Uppland (Nordquist 1922: 591). A fish farm focusing on raising common carp, crucian carp and tench was founded by J. Albert Ahlbäck in 1917 at Svankällan on Hisingen outside Gothenburg. He also published a booklet on tench in aquaculture (Ahlbäck 1931). The fish farm on Hisingen was operational until 1974.

The focus of aquaculture in the early twentieth century was on salmonids, common carp and tench (Lindstedt 1912; Nordquist 1922). The small crucian carp in the ponds were no longer of interest for food and their only economic significance was as bait and perhaps less so as aquarium fish. It was common for young boys in their games to move crucian carp from ponds to other small bodies of water and it was by this means that they were introduced into many small lakes all over Sweden and Finland (Sundman 1989: 6; Andersson 1942: 441). The impact of pond crucian carp on the wild populations is not known (cf. discussion in Moyle 1997). Tench have also been introduced into small lakes across Sweden and Finland (Lilljeborg 1891: 174).

Although cyprinids continued to be caught by fishermen and eaten during the first decades of the twentieth century (Trybom 1895), consumers gradually began to prefer sea fish on the table. At about this time, railway transportation made marine species (cod, haddock, whiting and flatfish) easily available and inexpensive all over the country, making fish from lakes and cultivated from aquaculture less popular. At the same time, there was a decline in interest in cyprinids as food in Sweden. Although some wild

species (bream) were still eaten, they were general rejected by modern consumers in after the end of World War II and they disappeared from the dining table. Only small ethnic enclaves continued to demand and consume cyprinids (Ståhlberg and Svanberg 2011).

Final remarks

The crucian carp had its heyday as a food fish in Sweden and Finland from the Late Middle Ages until the late eighteenth century. It has never regained the status that it enjoyed during this period despite several efforts to increase its popularity. The decline of crucian carp as a prominent table fish is mirrored throughout Western Europe. There is some patchy evidence from Finland that indicates that crucian carp taken from the wild are still occasionally used for the table. For instance, Professor Bo Lönnqvist, in correspondence from 3 March 2011, assured us that he still fishes for crucian carp in Strömfors in Eastern Uusimaa in Finland. The correspondence further describes how he prepares them for the table by smoking them. According to Lönnqvist this should be done before Midsummer (Lönnqvist *in litt.* 2011).

Remnant fishponds with stocks of crucian carp at manors and rectories are part of the biocultural heritage in Sweden and Finland and deserve to be preserved.

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Figure 4.1: Crucian carp pond at Alvastra Abbey (Photo: Ingvar Svanberg, 2010)

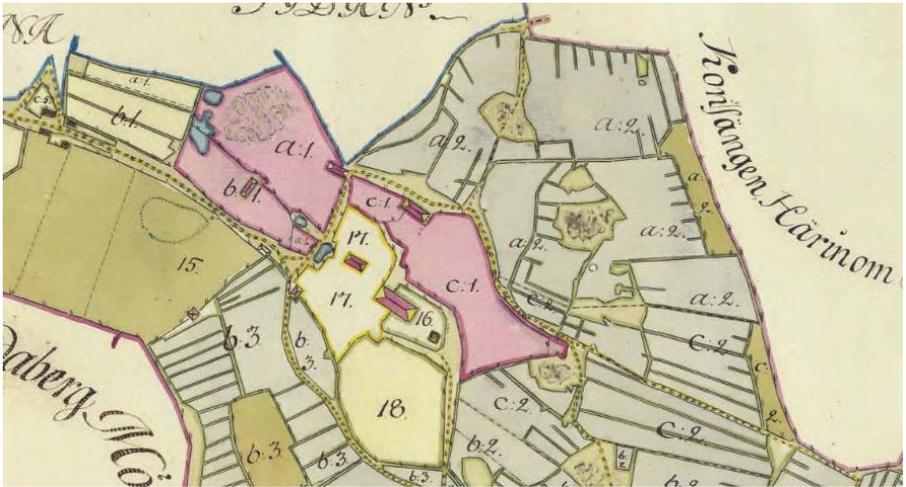


Figure 4.2: Cadastral map of Askeby from 1766

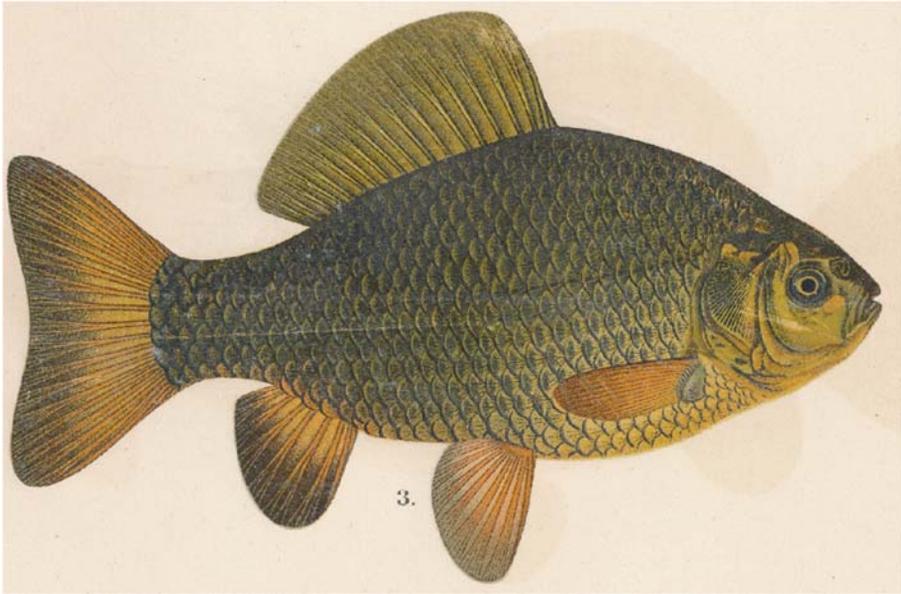


Figure 4.3: Pond variety of crucian carp by Wilhelm von Wright



Figure 4.4: Crucian carp pond at Ekolsund, Uppland.
(Photo: Ingvar Svanberg, 2012)



Figure 4.5: Former crucian carp pond at Sveaborg, Helsinki, Finland.
(Photo: Ingvar Svanberg, 2011)