

An Examination of the Economic Role of Table Fish in Ancient Rome

By

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Abstract

From many ancient sources, including Cicero and Pliny, it is clear that table fish were a luxury good in Rome. However, whether or not local coastal people could obtain fish from the same catches at a less extravagant price is a subject for debate. Fishing techniques mentioned in ancient literary sources, despite having seemingly low potential productivities, could be relatively efficient, and it is not impossible that less favorable fish could be sold to the general public while the choicest catch went to elite buyers. Such upperclass consumers took great pride in their ability to provide table fish to their guests. Small *piscinae* at villas ensured that the owner could always serve fresh fish at his table, and larger ones could be used to breed fish for economic gain. Fish also were imported over long distances to be raised in fishponds, but it is nearly impossible to determine how much this is because fish were scarce in certain areas and how much because discerning tongues were willing to pay a premium for fish caught in other waters.

Generally, it has been assumed that the low potential productivity ancient fishing practices prevented issues of sustainability and overfishing. However, comparing modern data to these Roman practices suggests that fishing could bring in very large catches even without modern technologies. Oppian mentions fishing from breeding stocks, which could damage stocks, and Juvenal describes overfishing in Italian waters. By examining literary and archaeological evidence of fishing and fish consumption, I analyze the scale of the Roman fishing industry and provide a likely model for the distribution of fish.

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I. Introduction

Little is known with certainty about the Roman fishing industry and table fish in the Roman economy. Many scholars in the past have supposed that fishing produced low catches and could not be especially profitable. Blaming a lack of refrigeration and quoting authors who refer to fish at lavish dinner parties, they assume that fish could be only a luxury good to the Romans. On the other hand, a few researchers have begun to look at fish as an economic resource and have questioned their longstanding position as a luxury good by comparing ancient fishing techniques to modern ones to determine the possibility of a large-scale Roman fishing industry.

Nevertheless, ancient authors who comment on the upperclass consumption of fish and the lack of archaeological evidence for table fish consumption seem to confirm that fish played an almost negligible role in the larger Roman economy. Cicero and Varro, for example, comment on fish ponds and table fish in the context of wealthy villas. Juvenal often makes references to the high cost of fish, and even though Juvenal is probably exaggerating, Pliny also complains that fish are extremely expensive. However, Pliny also gives information on fishing and catches which suggest that fishing was a major industry and not just a way to supply the luxury market. Oppian's *Haleutica* similarly provides insight into fishing during the Roman era in the Mediterranean, but his epic is focused more on telling an interesting nature adventure than explaining the supply of a natural resource.

However, even with the little evidence available, it is easy to see that fish must have played a more significant role in the Roman economy. Ancient fishing is poorly understood. The techniques of Roman fisherman and their potential productivity at first glance seem to pale in comparison to modern ones, but upon closer examination, it becomes obvious that the fishing

methods available to the Romans could bring in profitable catches. Fishing was certainly popular enough that the Roman government enforced restrictions and regulations on it, and some evidence exists for changes in fish stock availability. Among elite Romans, *piscinae* ownership removed much of the uncertainty in the availability of fish. Although some of the ponds may have been kept mostly for pleasure, most provided a quick supply of fresh fish and could have been used to farm fish for resale. Even though most of the extant literary evidence suggests that the consumption of fresh fish stopped at wealthy Romans, it seems unlikely that such a small sector of the economy, no matter what they were willing to pay for a fish, could have supported the fishing industry. It is more likely, therefore, that just the best fish entered high-end markets while the majority of a catch was retained and sold in local coastal markets.

II. Methodology

In this paper, I examine literary evidence for the distribution of fish and combine that with a study of archaeological remains of fish. Both present some limitations. Many of the literary sources comment specifically on the role of fish in upperclass society and use it as a mark of superfluous luxury. While this does not mean that fish were traded solely in high-end markets, it makes finding definitive information about the sale of fish in normal markets difficult to pin down. While the archaeological evidence could fill in many of the gaps left by ancient authors, fish bones are not always well preserved or recorded in much detail at many sites. Early excavations sometimes refer to fish bones, but their sites were not recorded, nor were species examined.¹

¹ David S. Reese, "Fish: Evidence from Specimens, Mosaics, Wall Paintings, and Roman Authors," *The Natural History of Pompeii*, Wilhelmina Mary Jashemski and Gustav Meyer, eds. (Cambridge: Cambridge University Press, 2002): 274.

The scarcity of data on ancient fish has forced me to look at a large geographical area and a wide time span for evidence. Although my focus is on Italy in the early Empire where perhaps the most evidence is available, I also look at larger trends in the Mediterranean. I have limited my investigation, however, to fish from the Mediterranean rather than river fish or fish from more northern waters. I have also looked at modern fishing to provide models for Roman fish since ancient data is so sparse and loosely defined. While the precise numbers I cite should not be relied upon as indicative of the Roman fishing industry, they provide a useful insight for determining the feasibility of fishing as a major industry in Rome.

I have also mostly eliminated processed fish, predominantly in the form of *garum*, and shellfish from my examination. The role of *garum* in the Roman economy has a large scope that cannot be fully developed here, and since the uses and distribution of *garum* and fresh fish differed, it is not necessary to compare the two. Some *garum* may have been made from fish scraps in homes, but most was produced on a larger scale at processing facilities from either small fish caught specifically for this purpose or perhaps the offal from larger fish.² Shellfish are similarly missing from my study because they were caught differently, farmed differently, and sold differently than finfish. Taking what evidence does exist for whole fish, I examine the feasibility of fish being a large part of the Roman economy rather than a good confined to the luxury niche.

² Andrew Wilson, "Marine Resource Exploitation in the Cities of Coastal Tripolitania," *L'Africa Romana* 14.1 (2002): 432.

III. Fish as a Luxury Good

There is no doubt that certain fish were luxury goods in the Roman market. Fishing was a dangerous occupation, and shipping fresh fish over any distance was certainly an expensive and difficult task. Most ancient authors make it clear that fish were part of an over-the-top luxurious lifestyle. Cicero, for example, remarks that food connoisseurs often turned to fish as especially choice and exotic fare at dinner parties with *optimis cocis, pistoribus, piscatu, aucupio, venatione, his omnibus exquisitis*.³

Wall paintings from Pompeii reinforce the status of fish in elite circles. *Xenia* paintings and mosaics often depict fish as a fine gift for the guests of the household (figs. 1 and 2). In these images, fish are set out in a whole state—they have been caught and presumably killed but are not yet cooked. Emphasis, therefore, falls on the freshness of the fish and highlights the owner's ability to provide the delicacy. Seascapes similarly often depict expensive fish with enough detail to identify the individual species of fish (fig. 3). Since these scenes depict living fish that swim through the image, these pictures also stress the freshness of the fish to which the owner had access; however, these seascapes also mimic an opulent feature of many upperclass villas—the *piscina*.

Although I will later discuss the possible economic benefits of *piscinae*, it is clear that fishponds served as a status symbol for villa owners. Because fish were so important to the upper-class meal and because they were difficult to ship while remaining fresh, many elite built *piscinae* at their villas. There, they could raise fish that would be incredibly fresh for their lavish dinner parties. John D'Arms, citing a Horace and Varro,⁴ notes that fresh shellfish and red mullet

³ “The best cooks, bakers, fish, birds, game, and all these sought-after things,” *De Fin* 2.8.23. All translations in this paper are my own.

⁴ *Sat.* 2.8.42-3, 85-93; *De Lingua Latina* 5. 109.

were considered major delicacies at *convivia*, where the host desired to create the illusion that he spared no expense for his dinner-guests.⁵

Maria Jaczynowska uses the example of L. Licinius Lucullus to show that *piscinae* primarily displayed wealth with any commercial gain as a secondary benefit. In fact, Lucullus was so well-known for his luxurious displays of wealth that the adjective *lucullanus* was born from his name. From Plutarch, Tacitus, and Varro,⁶ Jaczynowska pieces together the story of the optimate after his triumph in 66 BC. In addition to his opulent banquets, Lucullus ordered that a mountain be dug through in order to direct water to his fish ponds at his estate near Naples, and he established other *piscinae* at a villa near Baiae. Pliny adds that Lucullus' fish sold for 4,000,000 sesterces after his death.⁷ Jaczynowska argues that one of the ways the senatorial aristocracy could show their wealth was to display their possessions in a luxurious manner, competing against their neighboring nobles for the most refined villa. While the overly grand dinner parties alone certainly met this need, perhaps *piscinae* are a fitting symbol of this competition, a superfluous feature that could be built in an increasingly luxurious manner for a food that was already considered elite.⁸

Not surprisingly, then, most ancient authors depicted fish as a luxury good. Even passages that describe fish as a part of nature focus on the best varieties for eating. Apuleius, in his *Apologia*, quoted the poet Ennius, who translated the *Hedyphagetica*⁹ from Greek into Latin:¹⁰

⁵ John H. D'Arms, "The Culinary Reality of Roman Upper-Class Convivia: Integrating Texts and Images," *Comparative Studies in Society and History* 46.3 (2004): 430, 434-5.

⁶ *Lucull.* 36.7, 37.3-4; *Ann.* XI.1.32, 37; *RR* III. 3.10.

⁷ *HN* IX. 170.

⁸ Maria Jaczynowska, "Differentiation of the Roman Nobility at the End of the Republic," *Historia: Zeitschrift für Alte Geschichte* 11.H.4 (1962): 491-2.

⁹ qtd. in *Apul. Apol.* 39

¹⁰ Stefano DeCaro, ed, *Still Lives from Pompeii* (Naples, Italy: Electa Napoli, 1999), 17-8.

*Omnibus ut Clipea praestat mustela marina,
 mures sunt Aeni, aspera ostrea plurima Abydimus.
 Mytilenae est pecten Charadrumque apud Ambraciae sus.
 Brundisii sargus bonus est; hunc, magnus si erit, sume.
 apriculum piscem scito primum esse Tarenti;
 Surrenti tu elopem fac emas, glaucumque aput Cumas.
 quid scarum praeterii cerebrum Iouis paene suppressi
 (Nestoris ad patriam hic capitur magnusque bonusque)
 melanurum, turdum, merulamque umbramque marinam.
 polypus Corcyrae, caluaria pinguis acarnae,
 purpuram, murriculi, mures, dulces quoque echini.*

How superior to all is the sea weasel (moray) of Clipea, the “mice”¹¹ are at Aenos, the rough oysters are fullest at Abydos. The scallop is of Mytilene, and the “pig” (?) of Ambracia near Charadrum. The sea bream at Brundisium is good; take it, if it is large. Know that the best little-boar fish (grunt fish) is prime at Tarentum; you should buy the elops at Surrenti and the glaucus near Cumae. What? Have I passed up the parrotfish, nearly the brain of supreme Jupiter (It is caught in the country of Nestor and is big and good), and the black-tail, the “thrush” (?), the blackbird (wrasse?), and the sea ghost (?). Octopus of Corcyra, the fat skull-fish, the purple fish, the *murriculi*, the murex, and also the sea urchins are sweet.

This passage was originally written for a Macedonian or Epirote court, and so its audience was certainly looking for the best and probably most expensive fish.¹² Here is one of the major difficulties in relying on ancient literature to provide information on the Roman economy: many of them write with elite audiences in mind rather than the everyday Roman. Therefore, even though most of the literary evidence clearly show that fish functioned as a good in high-end markets, they are mostly silent on the role of fish in the Roman economy as a whole.

IV. Fishing Technology

Before considering the fish as a good on the market, it is important to examine the methods of harvesting fish. The efficiency of obtaining fish plays a large role in both their availability and their price once they are ready to be transferred to consumers. The main methods of catching fish were nets, hooks and lines, traps, and tridents. Some of these were obviously

¹¹ DeCaro translates this as octopus, but it may be a mussel or a species of finfish.

¹² DeCaro, 17-8.

more efficient than others, and certain types were used for particular fish. It has long been assumed that ancient fishing techniques were not extremely efficient, but this thought has been called into question recently, most notably by Tønnes Bekker-Nielsen. Bekker-Nielsen, in an attempt to show the extent of fishing in the Black Sea region during the Roman period, points out that fishing methods of the Romans are still used in some less modernized areas of the world where reasonably large catches can be brought in with simple technology.¹³

Unlike fishing, hunting, gathering, and agriculture on land take place on a basically two-dimensional plane with very few unknowns. Man (and most of the animals and plants he interacts with) always has his feet planted on the ground and he can see the entire environment when on land. People can easily control the land through agriculture and can readily reap a plentiful harvest without facing any major variables or dangers, and therefore, the land became a symbol of prosperity and an opportunity for wealth.¹⁴

However, the sea is an entirely different world antithetical to the land. The sea is three-dimensional, poor, and dangerous.¹⁵ As opposed to the land, the sea has depth; it is impossible for a fisherman to know what is below or around him in the water while he sits on the surface. This three-dimensionality of the sea means that the labors of fishermen are always uncertain, especially when the tracks of the fish are completely hidden.¹⁶ Fishermen may have to sail far from their home ports just to find decent fish stocks. Both Polybius and Livy relate an encounter between Scipio on his way to New Carthage and some fishermen. The fishermen gave Scipio

¹³ Tønnes Bekker-Nielsen, "Technology and Productivity of Ancient Sea Fishing," *Ancient Fishing and Fish Processing in the Black Sea Region*, Tønnes Bekker-Nielsen, ed. (Aarhus, Denmark: Aarhus University Press, 2006).

¹⁴ Lukas Thommen, *An Environmental History of Ancient Greece and Rome*, Philip Hill, trans. (Cambridge: Cambridge University Press, 2012), 53.

¹⁵ Thommen, 53.

¹⁶ Opp. *Hal.* I.35-6, 51-3.

detailed information of a lake more than 2,600 stades (~500km) away from their location.¹⁷

Whether or not a fisherman brings in a catch is based largely on chance and is not guaranteed by hard work, as a harvest on land is. Oppian constantly mentions the cunning of fishermen who use their crafty devices to help ensure catches of equally wily fish. He even opens the epic by writing that he will tell of ἀλίκης τε πολύτροπα δήνεα τέχνης κερδαλέης, ὅσα φῶτες ἐπ' ἰχθύσι μητίσαντο ἀφράστοις.¹⁸ Besides being clever at avoiding capture, the animals of the sea are much more dangerous than their land counterparts.¹⁹ The very nature of the sea is also much less predictable than that of the land. One ill-timed wave could mean disaster for a small boat, and Oppian praises the bravery of fishermen who must deal with raging waters, be on constant lookout for storms, and face the possibility of sea-monsters.²⁰

While little is known about Roman fishing vessels with certainty, several important facts can be gleaned from ancient authors and from images in ancient art. Most fishing boats in images are small, probably meant for two or three men, an oarsman and one or two fishers (fig. 4).²¹ Oppian also describes fishermen as setting out δούρασι δ' ἐν βαιοῖσιν.²² Such small craft obviously were meant to stay close to the shore and would not have been able to sustain long voyages in open water.²³

Larger fishing vessels with ten to twelve oars also existed. Oppian mentions such ships being used on a large *piscina*, calling the craft well-riveted and well-benched.²⁴ Still, there is no

¹⁷ Polybius *Histories* X.8, Livy *Ab Urbe Condita* XXVI.45.

¹⁸ “The wily devices of the sailor’s crafty device, which men have devised against incomprehensible fish,” *Hal.* I. 7-9.

¹⁹ Opp. *Hal.* V.21-40.

²⁰ *Hal.* I.41-9.

²¹ T.W. Gallant, *A Fisherman’s Tale: An Analysis of the Potential Productivity of Fishing in the Ancient World*, (Gent, Belgium: Belgian Archaeological Mission in Greece, 1985), 12.

²² “In tiny ships,” *Hal.* I.41.

²³ Gallant, 12.

²⁴ εὐγόμενον, ἐϋζυγον, *Hal.* I.58.

evidence of these well-built ships setting out into deep waters. Larger ships with sails may have been used for trolling, which requires the vessel to be moving at a faster speed than could be easily maintained over any period with oars.²⁵ Even though trolling usually takes place in deeper waters, much of it could still be done within sight of the coast.

There are four major types of fishing known from the ancient world—trident, traps, hook and line, and net. Oppian describes the use of the four methods in his *Haleutica*:²⁶

τέτραχα δ' εἰναλῆς θήρης νόμον ἐφράσαντο ἰχθυβόλοι: καὶ τοὶ μὲν ἐπ' ἀγκίστροισι γάνυνται, τῶν δ' οἱ μὲν δονάκεσσιν ἀναψάμενοι δολιχοῖσιν ὀρμιῇν ἵππειον εὐπλοκον ἀγρώσσουσιν:	75
οἱ δ' αὐτῶς θώμιγγα λινόστροφον ἐκ παλαμῶν δησάμενοι πέμπουσιν: ὁ δ' ἢ καθέτοισι γέγηθεν ἢ πολυαγκίστροισιν ἀγάλλεται ὀρμιῇσι. δίκτυα δ' αὐτ' ἄλλοισι μέλει πλέον ἐντύνεσθαι: τῶν τὰ μὲν ἀμφίβληστρα, τὰ δὲ γριφοὶ καλέονται,	80
γάγγαμά τ' ἡδ' ὑποχαὶ περιηγέες ἡδὲ σαγήναι: ἄλλα δὲ κικλήσκουσι καλύμματα, σὺν δὲ σαγήναις πέζας καὶ σφαιρῶνας ὁμοῦ σκολιόν τε πάναγρον: μυρία δ' αἰόλα τοῖα δολορραφῶν λῖνα κόλπων. ἄλλοι δ' αὖ κύρτοισιν ἐπὶ φρένα μᾶλλον ἔχουσι,	85
κύρτοις, οἳ κνώσσοντας ἐοὺς ἡϋφρηναν ἄνακτας εὐκήλους: βαιῶ δὲ πόνῳ μέγα κέρδος ὀπηδεῖ. ἄλλοι δ' οὐτάζουσι τανυγλώχινι τριαίνῃ ἔλλοπας ἐκ χέρσου τε καὶ ἐκ νεός, ὥς ἐθέλουσι. τῶν πάντων καὶ μέτρον ὅσον καὶ κόσμον ἐκάστου	90
ἀτρεκέως ἴσασιν, ὅσοι τάδε τεκταίνονται.	

Fishermen have thought up four customs of fishing: some delight in hooks, and of these, some fish by fastening a well-braided line of horsehair to a long reed: others even cast the flaxen cord from their hand, bound right to it: some like stationary lines and others love a line with many hooks (long-line). To others, laying out nets is preferable: they call some of these throwing nets and others creels, and there are drag-nets and bag-nets and seines: others they call cover-nets, and with the seines, there are ground-nets and ball-nets and the curved trawl: the varying types of crafty-bosomed nets are infinite. Still others set their minds more on weels (wicker traps), which gladden their masters even while they sleep at ease, since great profit follows light work. Others wound the fish with a long-pronged trident from land or from a ship, as they wish.

²⁵ Gallant, 12.

²⁶ 3.72-89.

T.W. Gallant examined all four of these methods and their potential productivity in his famous book, *A Fisherman's Tale: An Analysis of the Potential Productivity of Fishing in the Ancient World*. Since its publication, several other scholars, notably Tønnes Bekker-Nielsen, have called his methods into question, primarily because he relies only on modern statistics and largely assumes that because ancient fishing techniques were not as efficient as modern technologies, the catches were necessarily too small to produce enough fish for significant monetary gain. Although some of Gallant's conclusions may not be reliable, his analysis of the potential productivities each method for catching fish provides an invaluable starting point to studying the accessibility of fish.

Of the four major methods of fishing, tridents have possibly the lowest level of potential productivity according to Gallant. From the boat, a fisherman could stab a fish near the surface, perhaps trapped in a seine or simply attracted with torches or bait. The trident could also be used on a line, almost like a harpoon, so that it could be thrown and retracted once the fish was speared. Sometimes an arrow was employed in a similar manner with the same results. This technique requires intensive labor, and it can be used successfully on only a few varieties of fish. Only one fish can be caught at a time, and it must be a surface species. The success or failure of this technique depends almost entirely on the luck of the thrower.²⁷

However, modern assessments of spear-fishing show that the ancient trident could have been an extremely effective fishing method. Examining spear-fishing of groupers off the Florida Keys, Sluka and Sullivan found that because fishermen could target individual fish, they could catch only the largest individuals. This pressure was significant enough to lead to a decrease in

²⁷ Gallant, 13.

the average size of groupers in areas where the spear-fishermen hunt them.²⁸ In a survey of spear-fishing in the Cape Creus Marine Protected Area in Spain, Lloret et al. found that 70% of spear-fishermen used small boats and the remaining 30% just waded into the water.²⁹ This is consistent with the images depicting ancient fishermen using tridents from small fishing boats. The same study found that the catch-per-unit-effort (CPUE) of spear-fishing was 1.36 kg/fisher/fishing hour, much higher than the CPUE when fishing with a bottom fishing rod (0.10 kg/fisher/fishing hour). Even though more species could be caught with a bottom fishing rod, they were generally smaller individuals than those that were obtained by spear-fishing. Similarly, spear-fishing accounts for only 17% of total recreational fishing activity in the Marine Protected Area while boat fishing accounts for 60%, but both extract approximately the same amount of total biomass (estimated at 20 tonnes annually). Spear-fishing, in fact, produces about 40% of the catch of a modern artisanal catch, a not insignificant amount.³⁰

Fish traps or weirs were used frequently to modest effect. While several designs were possible, the most common was the bell-weir. In a bell-weir, a funnel-shaped piece of net is placed over the mouth of the trap, and bait is placed inside it. A fish can easily swim inside, but cannot swim back out. Although they require very little effort on the part of the fisherman, these traps can only catch a few fish at a time. A fisherman can leave a trap for long periods or have one set while performing other tasks, but Gallant states that traps like these are mostly effective for capturing only solitary species close to shore.³¹ Conversely, a study of modern fish traps in the U.S. Virgin Islands found that traps could catch an average of about six fish per trap and

²⁸ Robert D. Sluka and Kathleen M. Sullivan, "The Influence of Spear Fishing on Species Composition and Size of Groupers on Patch Reefs in the Upper Florida Keys," *Fishery Bulletin* 96 (1998): 390-1.

²⁹ Josep Lloret et al., "Spearfishing Pressure on Fish Communities in Rocky Coastal Habitats in a Mediterranean Marine Protected Area," *Fisheries Research* 94 (2008): 86.

³⁰ Lloret et al., 89.

³¹ Gallant, 13-4.

collected 59 different species of fish.³² Considering that Pliny counts 74 species of fish in existence,³³ fish traps were probably much more effective than Gallant gives them credit, especially since they require minimum effort and can be left untended while a fisherman worked on other tasks.

Hook and line fishing was by far the most popular method of catching fish. Of all the methods, hook and line fishing requires the least equipment and the least expertise. Gallant insists that fishing with hook and line fishing would have been used only to supplement daily diet and would not have been a full-time occupation, but he describes three main types of hook and line fishing while assessing their potential productivity: rod and line, hand lining, and “stringers.” Rod and line fishing consists of a line, frequently made of horsehair in ancient times, and a single hook or in some cases multiple hooks. The weak tensile strength of the line and the limited depth potential makes this method best suited for catching small, inshore species. Although not labor intensive, this rod and line fishing has a low potential productivity and is very time consuming. Hand lining uses a stronger flaxen line with multiple hooks, and this method was most effectively used on large, open-ocean species and could be used in trolling. While the potential productivity is higher than that of rod and line because of the possibility of catching several large fish at the same time, it does require more labor, with six to ten men necessary for the job. In “stringers,” or long-lines, lead lines with hooks were attached to a flaxen line, both ends of which were attached to logs that served as buoys. The individual hooks could be floated with cork or sunk with lead sinkers, depending on what species were sought. This method is advantageous because it can be set and left for long periods, and can theoretically

³² V.H. Garrison, C.S. Rogers, and J. Beets, “Of Reef Fishes, Overfishing, and *in situ* observations of fish traps in St. John, U.S. Virgin Islands,” *Revista de Biologia Tropical* 46.5 (1998): 45

³³ HN IX. 43.

catch as many fish as there are hooks on the line. However, the potential productivity is still not much higher than the other methods of line fishing.³⁴

Of all the ancient fishing methods, nets have the highest potential productivity. The problem comes in trying to ascertain exactly what types of nets were used. Many types of nets could have been referred to under several different names, for example, what type of fish the net was meant to catch, what sort of mesh it was made from, or how it was meant to be used.³⁵ At least five nets are known with great certainty. A γρῖφος was a small, flaxen creel used for storing fish rather than catching them. A ὑποχής was a scoop net, a net attached to a pole, and two possibilities exist for its usage. A fisherman could use a scoop net to catch fish directly by wading into the water with it or by lowering it over the side of a boat and waiting for fish to swim into it. On the other hand, this type of net can also be used to land fish already caught with a hook and line. An ἀμφίβληστρα was a circular net with weighted edges used for hand-casting. When a fish swims into range, the fisher can throw the net onto the surface of the water and it will sink, trapping the fish. While this method could be profitable, it does require a great deal of skill to manipulate properly. A σαγήνη was a beach seine, a net consisting of two tapered wings and a full middle section. The top edge was floated with cork and the bottom weighted with lead. To use it, a group of men would stand on shore holding one wing while a boat laid the net in a semi-circular pattern until arriving further down the shore where a second group of men would receive the other wing. The net could then be dragged in, capturing all the fish that happened to be within it. The catch from a seine is very high, but it requires 14 to 20 men and is very labor intensive. An ἐκπεπταμένα δίκτυα was an umbrella net, similar to an ἀμφίβληστρα; however, the

³⁴ Gallant, 14-6.

³⁵ Gallant, 23-5.

umbrella net is allowed to fall to the bottom and the fisherman waits for a bottom feeder to swim over it before pulling up and capturing it.³⁶

In all probability, several other types of nets were also used. For example, many nets called simply λίνοι (linen) seem to be gill nets. In this type of net, one or both ends are fixed and fishermen often slap the surface of the water, inciting fish to swim away from them and into the net where their gills become stuck in the mesh of the net. While this can be a very effective method of catching fish, only a couple of similar sized species can be caught at one time because fish larger or smaller than the mesh cannot be caught in it. Thus, the manufacture of such nets had to be very precise, and Gallant casts doubt on how effectively these could have been made with ancient technology.³⁷ On the other hand, gill nets were used to great effect in Mesopotamia, and so the Romans certainly had access to sufficient technology for creating precise gill nets.³⁸

Gallant asserts that all of the nets were shore-based, and even though some may have been used from boats in shallow water, none were designed to be used in deep, open water.³⁹ Bekker-Nielsen adds that fishing from shore, even in modern times, can bring in extremely large catches.⁴⁰ Additionally, fish processing plants in Iberia seem to have produced only salted sardines and not salted anchovies, both of which can be found in Iberian waters. Adult anchovies, unlike adult sardines, tend to live farther offshore, and this fact may support that fishing was mostly littoral.⁴¹

³⁶ Gallant, 16-20, 25.

³⁷ Gallant, 20-1.

³⁸ Anne Lif Lund Jacobsen, "The Reliability of Fishing Statistics as a Source for Catches and Fish Stocks in Antiquity," *Ancient Fishing and Fish Processing in the Black Sea Region*, Tønnes Bekker-Nielsen, ed. (Aarhus, Denmark: Aarhus University Press, 2006): 102.

³⁹ Gallant, 23-5.

⁴⁰ Bekker-Nielsen, 85.

⁴¹ Arturo Morales-Muñiz and Eufrosia Roselló-Izquierdo, "Twenty Thousand Years of Fishing in the Strait: Archaeological Fish and Shellfish Assemblages from Southern Iberia," *Human Impacts on Ancient Marine Ecosystems: A Global Perspective*, in Torben C. Rick and Jon M. Erlandson, eds. (Berkeley: University of California Press, 2008): 264.

Conversely, Roman sites in southern France have produced remains of several benthic and pelagic species, so Roman fishermen must have been efficient to at least some degree in deep-water fishing.⁴² Fish bones from the Late Roman settlement at Itanos, Crete have also shown that some pelagic species were caught. Although the bones of these species are found in very small numbers compared to the more popular fish varieties that could be caught in shallow waters, their presence indicates that some fishermen must have traveled significantly farther from the coast to catch them. Perhaps their scarcity indicates that the fishery for deep-water species was not well-developed, or perhaps, as in the case of sand smelt (*Atherina* sp.), the bones of popular pelagic species were eaten with the fish or simply fragile and not well preserved.⁴³

V. Fish Stocks and Catches

The Mediterranean is a notoriously infertile body of water. The concentration of nutrients is very low and the continental shelf is rather narrow.⁴⁴ The Sea is shallow, salty, warm, and has few currents that can bring oxygen to the lower depths or transport important nutrients from the bottom to the surface. The algae and phytoplankton that form the basis of the ecosystem instead depend mainly on nutrients from runoff. Because of these factors, very few fish are found in the deeper levels, but the surface waters do contain many valuable fish that would have been easily accessible using ancient fishing methods.⁴⁵

With most goods available on the market, demand dictates the supply and production of that good. If, for example, the market emits a signal for more cabbage, farmers can produce more

⁴² Geoffrey Kron, "Animal Husbandry, Hunting, Fishing, and Fish Production," *The Oxford Handbook of Engineering and Technology in the Classical World*, John Peter Oleson, ed. (Oxford: Oxford University Press, 2008), 205.

⁴³ Dimitra Mylona, "Fishing in Late Antiquity: The Case of Itanos, Crete," *British School at Athens Studies* 9 (2003), 104-5.

⁴⁴ Gallant, 40.

⁴⁵ J. Donald Hughes, *Ecology in Ancient Civilizations* (Albuquerque: University of New Mexico Press, 1975): 17.

cabbage and supply it to the market. There are few variables of nature that can prevent a farmer from producing more of a certain crop or animal, as long as he has sufficient land and access to monetary resources. While certain methods can be taken to catch specific fish—using certain bait or fishing methods or fishing in an area where that fish is known to frequent—the fish caught are largely dependent on chance.⁴⁶ However, fish assemblages from Baelo Claudia in Spain shows that specific fish were targeted during the Roman period, but earlier and later settlements in the area never focused on individual species.⁴⁷ Furthermore, even if fishermen can exploit one specific type of fish, they may negatively affect the stock for future harvest. Catching an abundance of cod may decrease the overall supply of cod while increasing the stock of herring, a major food source of cod.⁴⁸

In general, heavy fishing on any species can reduce the average size and age of local populations even if the supply of the overall stock is left intact. Larger, older individuals are typically the most valuable to fishermen, but they also are almost always breeding adults that lay more eggs or have more offspring than smaller individuals. Technological limitations, such as the size of the boats or efficiency of the fishing methods, may have alleviated many of the effects of overfishing particular species in Roman times.⁴⁹

However, as seen above, many of the fishing methods employed by the Romans could be very efficient, and it is difficult to make definitive statements about the health of fish stocks since only modern data are available in the fishing industry. It has been a common habit to base understandings of ecological patterns on observations not much more than 30 years old. Such

⁴⁶ Bo Gustafsson, “Nature and Economy,” *Nature and Society in Historical Context*, in Mikuláš Telch, Roy Porter, and Bo Gustafsson, eds. (Cambridge: Cambridge University Press, 1997): 359.

⁴⁷ Morales-Muñiz and Roselló-Izquierdo, 271.

⁴⁸ Gustafsson, 359.

⁴⁹ Jon M. Erlandson and Torben C. Rick, “Archaeology, Marine Ecology, and Human Impacts on Marine Environments,” *Human Impacts on Ancient Marine Ecosystems: A Global Perspective*, Torben C. Rick and Jon M. Erlandson, eds. (Berkeley: University of California Press, 2008): 10.

observations fail to take into account that many indigenous populations probably fished certain populations heavily, at least enough to alter the stocks. Even hunter-gatherer and very early agricultural societies are associated with the destruction of habitats and the extinction of certain land animals; therefore, it is very likely that a society as advanced as the Romans could cause significant changes in marine populations.⁵⁰

Most fisheries throughout history, in fact, have lacked restrictions on exploitative activities. While some fishing communities may have been able to impose restrictions on their members, for the most part, fishermen follow any method available to catch the most and largest fish. For example, fishing from breeding stocks, nursery grounds, or migration routes can permanently damage stocks.⁵¹ Oppian describes fishermen catching tuna that have come closer inland to breed.⁵² The fishermen would not normally have such easy access to the tuna, and therefore logically took advantage of their migratory routes. Still, taking individuals, especially the largest ones, from a breeding population could easily cause lasting changes in the fish stock.

The Roman government did rent fishing rights on coasts, lakes, and rivers.⁵³ Valerius Maximus records that Considius, who held the contracts for the Lucrine Lake, sued Sergius Orata, known for his oyster ponds, because he *se publicae aquae cupidius immergit*.⁵⁴ This alone may not point to an organized management of fisheries to protect stocks. However, in most fisheries, governments enforce restrictions when some change happens in the fishery, most often a noticeable depletion of a stock. Usually implementation of these regulations causes more harm to the fishery than good. Such regulations cause catches to be lower and are implemented before

⁵⁰ Erlandson and Rick, 1, 3.

⁵¹ James Acheson, "Distribution Fights, Coordination Games, and Lobster Management," *Natures Past: The Environment and Human History*, Paolo Squatriti, ed. (Ann Arbor: The University of Michigan Press, 2007): 19.

⁵² *Hal.* III. 620-2.

⁵³ Hughes, 106.

⁵⁴ "Immersed himself too greedily into public waters," *Factorum et Dictorum Memorabilium* IX. 1. 1.

the fishing would do lasting damage to stocks, especially when one government, in this case, Rome, controls the majority of the waters.⁵⁵

However, Juvenal comments that fish were often imported from great distances to Italy. He paints the Mediterranean as devoid of fish from the level of overharvesting, and he even laments that fish in Italian waters are not reaching large sizes:⁵⁶

*Mullus erit domini, quem misit Corsica vel quem
Tauromenitanae rupes, quando omne peractum est
et iam defecit nostrum mare, dum gula saevit,
retibus adsiduis penitus scrutante macello
proxima, nec patimur Tyrrhenum crescere piscem.*

There will be mullet for my master, which Corsica or the rocks of Tauromenium sent, since all have been killed and now our sea fails, while gluttony rages, and while the fish-market continuously and thoroughly searches with nets, we do not allow the Tyrrhenian fish to grow.

Desse-Berset examined fish bones from the Sud-Perduto and found that the size of many types of fish caught by Roman fishermen would have been larger than those today, but have suffered a decrease in size due to the overfishing of the largest individuals.⁵⁷ There is also considerable evidence that deforestation during Roman times led to the silting of coastal areas and a change in coastal marine habitats, which certainly would have altered fish migratory patterns, if not the fish stocks themselves.⁵⁸ Perhaps the best evidence for the change in availability of a stock is Pliny's note that Tiberius had parrotfish (*Sparisoma cretense*) introduced to Italian waters. For five

⁵⁵ J.A. Gulland, "Appraisal of a Fishery," *Methods for Assessment of Fish Production in Fresh Waters*, in W.E. Ricker, ed. (Oxford: Blackwell Scientific Publications, 1971), 259.

⁵⁶ I. V. 92-6.

⁵⁷ Nathalie Desse-Berset, "Contenus d'amphores et surpeche; l'exemple du Sud-Perduto," *Exploitation des animaux sauvages a travers le temps; actes des recontres, 15-16-17 Octobre 1992; XIIIe Recontres internationales d'archeologie*, J. Desse and F. Audoin-Rouzeau, eds. (Juan-les-Pins: Editions APDCE, 1993), 341-6.

⁵⁸ Enric Sala, "The Past and Present Topology and Structure of Mediterranean Subtidal Rocky-Shore Food Webs," *Ecosystems* 7.4 (2004), 336-7.

years, all of the fish caught were supposedly put back so that they could establish their populations, and in Pliny's time, they were plentiful.⁵⁹

Signs of depletion of fishing stocks are extremely difficult to detect in the archaeological record, especially since the records for Roman fisheries are so incomplete.⁶⁰ However, an examination of the fish used may give some insight into the availability of certain species. In Iberia, for example, tuna were the dominant fish for at least 600 years, but in the first two centuries CE, mackerel suddenly became the preferred fish in the area. Quickly following on the heels of the mackerel stage, a clupeid⁶¹ stage began, and although their use dates back much earlier, other fish tend to be absent or found in very small numbers during this stage. It is impossible to say with certainty that the change in fish use represents change in available stocks; a simple change in preference could explain the difference. Furthermore, even if populations did change in the area, the change may be due to a number of environmental factors⁶² rather than because stocks were overharvested.⁶³

Environmental changes, in this case change in the dominant fish harvest, often coincide with social crises. The shift from tuna to mackerel in Iberia in the first century CE did not correspond to any major social unrest. Perhaps, if there was a disappearance of tuna and the fishermen were forced to find a replacement, mackerel served as a perfect substitution and could be caught with the same gear. If the change could be made with little economic impact, it follows logically that it would also cause no major social crises. On the other hand, the switch from mackerel to clupeids did correspond with the third century CE crisis. While loss of fishing stocks

⁵⁹ *HN IX. 29.*

⁶⁰ Morales-Muñis and Roselló-Izquierdo, 266.

⁶¹ The family *Clupeidae* contains fish like herrings and sardines.

⁶² For example, salinity variations from altered outflow from rivers or runoff could force the migratory patterns of fish further from shore.

⁶³ Morales-Muñis and Roselló-Izquierdo, 263-5.

certainly cannot be blamed for the entire crisis, environmental changes definitely could have put pressure on an already weakened economy. Conversely, it is also possible that the economic stress forced a change in the practices of fishermen and fueled the change. Clupeid fishing uses less sophisticated gear and smaller vessels than those needed to catch larger fish, and while the larger fish could be salted and sold whole, the small clupeids were most likely used in cheap *garum*.⁶⁴

VI. Fish Ponds and Fish Farming

Fishponds were popular in the first century BCE the first century CE in Italy, but the extent to which these *piscinae* actually provided economic gain is debatable. While some ponds may have been used for farming or breeding fish, others were simply a holding area to ensure that the owner's table was well-stocked, and still others were meant as aquaria for pet fish. One thing, however, is clear: *piscinae* served as a symbol of social status. Cicero, in a letter to Atticus, dubs the upperclass "piscinarii." He complains that fishpond owners spent too much time caring about their *piscinae* rather than showing concern for the Republic: *Nam ut ait Rhinton, ut opinor, "οἱ μὲν παρ' οὐδέν εἰσι, τοῖς δ' οὐδέν μέλει."* *mihi vero ut inuideant piscinarii nostri aut scribam ad te alias aut in congressum nostrum reservabo*.⁶⁵ By the late Republic, it seems, pisciculture had become a status symbol first, and concern for possible economic gains remained secondary. This fact does not mean, however, that fishponds were not used to generate any profits.

⁶⁴ Morales-Muñis and Roselló-Izquierdo, 265.

⁶⁵"For as Rhinton said, or so I think, 'Some men are for nothing, others care about nothing.' But, I will write to you another time or reserve for our meeting how our *piscinarii* envy me," I.20.3.

The Romans had *piscinae* of two main varieties—saltwater and freshwater. Both were associated with upperclass villas. Rarely, saltwater fishponds were cut from the natural rock shelves next to the ocean, and were simple, albeit expensive, to maintain.⁶⁶ The nature of the rock allowed fish easy access to hiding places and shade without the owners having to specially construct anything. More common were hybrid cut rock and concrete seaside ponds. With the use of partially constructed *piscinae*, owners could employ a greater variety of locations, sizes, and shapes for their ponds while still taking advantage of the same benefits as totally rock-cut fishponds. Located next to an abundant water source, saltwater ponds tended to be placed near areas where fish congregated naturally, and therefore, a fresh supply of ocean fish was readily available.⁶⁷

Inland ponds relied on freshwater sources. During the late Republic, such freshwater ponds were held in low esteem presumably because freshwater fish were considered food for people of a lower socioeconomic status. However, during the early Empire, Augustus' reorganization of the water supply and the construction of several major aqueducts fostered an era of increased freshwater use and subsequently a rise in the construction of freshwater *piscinae*. Freshwater *piscinae* tended to be much smaller than their saltwater counterparts, and their construction was much more difficult. Although they were built below ground level to stabilize the structure, marshy soil often forced owners to reinforce the structures with layers of rock, wooden planks, and other fill. Furthermore, the cement walls of the pond needed to be waterproofed since inland ponds had no direct contact with their water source.⁶⁸

⁶⁶ Costis Davaras, "Rock-Cut Fish Tanks in Eastern Crete," *The Annual of the British School at Athens* 69 (1974), 87.

⁶⁷ James Higgenbotham, *Piscinae: Artificial Fishponds in Roman Italy* (Chapel Hill: The University of North Carolina Press, 1997):10-3, 18-20.

⁶⁸ Higgenbotham, 20-1.

No matter whether the *piscinae* were salt- or freshwater, adequate circulation was a key feature to keep fish alive and healthy. Owners of *piscinae*, no doubt, understood the importance of creating proper conditions to keep their investments safe. Proper water circulation allows for the exchange of gases,⁶⁹ stability of water conditions,⁷⁰ and filtration. Inland freshwater fishponds could be easily supplied by aqueducts, natural springs, or cisterns and fed through pipes by gravity. Even many seaside saltwater ponds were located near freshwater sources, which could allow for circulation. Freshwater could also be mixed with seawater to create more brackish conditions, which were thought to be attractive to fish. Additionally, seaside saltwater *piscinae* could have small channels carved into them to allow seawater to flow through the pond and circulate the water.⁷¹

Above all, *piscinae* represent an attempt to control nature. Oppian describes the sea as a dangerous place, only traversed by brave men who encounter unpredictable seas and unseen horrors, like sea monsters. Moreover, fish stocks could be elusive, and fishermen could spend countless hours searching for their prey without hauling in a large catch.⁷² Fishponds created a perfect way to bring an unpredictable aspect of nature under human control, a common practice for the Romans.⁷³

Although many other types of fish could be kept in fishponds, Higgenbotham, in his study of the *piscinae* of Pompeii, identifies seven major varieties in Italian *piscinae*: *murena*, *mugil*, *lupus*, *aurata*, *mullus*, *rhombus*, and *scarus*. Of these, *murena* were by far the most popularly mentioned in connection with fishponds. The term may refer to any eel-like creature, including *anguilla* (common eels), *congrus* (conger eels), morays, and lampreys. Eels are ideal for

⁶⁹ Most importantly, oxygen.

⁷⁰ Salinity, temperature, and pH levels, in particular.

⁷¹ Higgenbotham, 12-16.

⁷² *Hal.* I.41-55.

⁷³ Hughes, 90.

fishponds because they can adapt to a wide range of salinities, grow to large sizes,⁷⁴ and can be kept in high densities not possible with other fish.⁷⁵

Several of the other six types of fish are less well attested in *piscinae* than eels but still adapt well to the conditions of captivity. *Mugiles*, associated with several species of gray mullet,⁷⁶ adapt well to both brackish and freshwater environments, making them ideal for fishponds. Columella even praises their hardiness in captivity.⁷⁷ The propensity of *mugiles* for jumping may have made them difficult to keep in enclosures, but this tendency could be easily counteracted by building higher sides on the enclosures. *Lupi*⁷⁸ were sea fish that could be caught in streams, meaning that they could be easily kept in *piscina* conditions, although they were apparently difficult to catch. The *aurata*, or gilthead,⁷⁹ like the others, adapts well to a range of salinities.⁸⁰

Other species associated with fishponds may not have been perfect fits for pisciculture. Unlike most of the other species, *mulli*, identified as red mullet,⁸¹ tend to be solitary creatures that live in open water rather than in brackish conditions near the shore. However, the potential profit for this extremely luxurious fish certainly made it an attractive choice for fishponds. *Rhombi*, referring to any type of flatfish but especially flounder and sole, also probably presented a means to profit, even if they were not ideal for *piscinae*. Similarly, *scari*, parrot wrasses,⁸² were

⁷⁴ Some varieties can reach over 2 meters in length and weigh twenty to thirty kilograms.

⁷⁵ Higgenbotham, 43-6.

⁷⁶ From the modern family *Mugil*, the most common to the Mediterranean are the *M. cephalus*, *M. chelo*, *M. capito*, and *M. auratus*.

⁷⁷ *Rust.* 8.17.8.

⁷⁸ Probably the modern family *Labridae*, including the *Labrax lupus* or *L. dicentrarchus*, commonly called wrasse or sea bass.

⁷⁹ *Sparus aurata*, also commonly referred to as porgy, bream, dentice, umbrina, or dorade.

⁸⁰ Higgenbotham, 46-8.

⁸¹ *Mullus surmuletus* and *M. barbatus*.

⁸² From the modern family *Scaridae*.

an extremely popular food fish that some owners attempted to cultivate with very limited success.⁸³

Higgenbotham doubts that fishponds were used to any extent for profit, citing the lack of evidence linking fishponds to the production of fish sauces. He also notes that selling fish was considered a lowerclass activity in which wealthy *piscinae* owners would not have participated. The fish raised in these ponds served the villa owners mostly for show or pets. Instead, he argues that *piscinae* would have perpetuated self-sufficiency. Because fish were an expensive commodity and because they featured so prominently in the elite diet, a villa owner could only benefit from having a fresh supply of fish that he raised himself. The major economic value in having a *piscina*, Higgenbotham asserts, seems to have been in impressing peers and rivals, thus driving up spending on luxury goods.⁸⁴

While it is true that many species of fish could not be bred in the conditions of a *piscina*, farming cannot be excluded for all types of fish. Varro describes fishponds divided into sections to keep certain fish separated.⁸⁵ It is likely that such a pond functioned only to separate fish that would otherwise attack each other.⁸⁶ While a compartmentalized tank could be used to divide various species, it also could be used to separate fry from the older fish that would eat them. Excavations at the Roman harbor at Cosa have revealed several *piscinae* that could have been used either for holding freshly caught fish that would soon go to market or for raising fry to later release into the lagoon. Both practices are common in the modern harbor there.⁸⁷

⁸³ Higgenbotham, 48-52.

⁸⁴ Higgenbotham, 57.

⁸⁵ *RR.* III. 17.

⁸⁶ Davaras, 89.

⁸⁷ Anna Marguerite McCann, "The Harbor and Fishery Remains at Cosa, Italy," *Journal of Field Archaeology* 6.4 (1979), 403.

VII. Fish in the Economy

Tracking the economic models for fishing in antiquity is especially difficult. While *garum* factories show the demand for processed fish on a large scale, archaeological evidence for table fish is almost nonexistent. Very recently, however, more attention has been paid to fish bones at more residential sites. In Herculaneum, for example, Mark Robinson suggested that deposits that contain fish remains found below downpipes should be analyzed individually, rather than as a whole, to show patterns of consumption.⁸⁸ Still, the evidence currently available is scanty. As mentioned above, fish remains have not always been well preserved or documented. Only with more work in line with that of Robinson can more definitive assertions be made on the sale and consumption of fresh fish. Until then, we must look mostly to theoretical models based on the evidence available.

On one side, Gallant argues that fishing was mostly a secondary activity. Farmers would have fished as an offset to fluctuations in crop yields. Although he considers fish a supplement to an otherwise land-based diet, he admits that fish catches could have been frequent and even used as a cash crop sold directly to the market in a poorer harvest. For Gallant, the movement of fish was far too unpredictable to provide a reliable food source or income.⁸⁹ However, Oppian suggests that fishermen did their work as a fulltime occupation and insists that they fished in every season: εὖ δὲ φέροι καὶ χειῖμα Διὸς καὶ δίψιον ὥρην Σεπρίου.⁹⁰

In fact, other scholars have proposed that fishing was a full-time activity and was a much more important part of the economy. Jacobsen suggests that areas with poor farmland almost certainly saw fishing as a primary and not just supplementary activity. In her model, infertile

⁸⁸ Andrew Wallace-Hadrill, *Herculaneum Past and Future* (London: Francis Lincoln Limited, 2011): 283.

⁸⁹ Gallant, 41-2.

⁹⁰ “He should bear well both the wintery weather of Zeus and the thirsty season of Sirius (summer),” *Hal.* III. 47-8. Lines 50-71 of the same book also name the best times of day during each season for fishing.

land leads people to choose fishing as a main activity while still using crops to complement the harvest from the sea. However, she is reluctant to comment on whether the fishing was primarily subsistence or whether fishing communities brought in catches large enough to sell on the market.⁹¹ Horden and Purcell agree with Gallant that fish could be sold as a cash crop when a farmer needed extra income; nevertheless, they maintain that fish more likely were seen as an asset on their own.⁹² While there is no way to definitively delineate the role of fishing in the economy, the demand for fish even as just a luxury good seems to suggest that fishing was more than just a supplementary activity. Indeed, *garum* processing plants, such as the one at Baelo Claudia, show that fishing had to be a major industry in Rome. Farmers along coasts could certainly fish for their families or even to increase their profits, but fishing had to have been a fulltime industry on its own.

How *piscinae* fit into this model of fish supply is not well understood. Many fishpond owners loved their fish like pets, and most *piscinae* may have been merely for show.⁹³ While discussing *murena* raised in ponds, Pliny notes that one man was so in love with his fish that he cried when they died and that a woman enjoyed putting earrings on her favorite eel.⁹⁴ Similarly, Cicero tells Atticus about the *piscinarii* petting their mullets. Varro also mentions that many fish in *piscinae* were never cooked and that owners enjoyed simply keeping the fish, even at great expense.⁹⁵ These accounts imply that perhaps fishponds were mostly just aquaria on which rich people freely wasted money, either for their own enjoyment or for showing off their wealth to their neighbors.

⁹¹ Jacobsen, 104.

⁹² Peregrine Horden and Nicholas Purcell, *The Corrupting Sea: A Study of Mediterranean History* (Oxford: Blackwell Publishers, 2000), 195.

⁹³ J.M.C. Toynbee, *Animals in Roman Life and Art* (London: Thames and Hudson, 1973), 209.

⁹⁴ IX. 81.

⁹⁵ *RR.* III.17.

On the other hand, ancient authors also comment on fishponds used to supply food for at least the household, if not for the market. Martial tells that a man could easily catch a fish cast from his couch to get a fresh fish for his table:⁹⁶

*Nec saeta longo quaerit in mari praedam,
Sed a cubili lectuloque iactatam
Spectatus alte lineam trahit piscis.
Si quando Nereus sentit Aeoli regnum,
Ridet procellas tuta de suo mensa.*

Nor does the fishing-line search for the booty in the far-off ocean, but the fish having been seen from above, drags the line thrown from a bed or a couch. If at any time Nereus perceives the power of Aeolus, the table, safe on its own, laughs at the gales.

Paul Erdkamp, furthermore, argues, “the primary function of many Roman villa's undoubtedly was to ensure their owner a secure investment and a steady income.”⁹⁷ With their land, they could concentrate on agricultural pursuits that would bring in money. This could include growing crops, raising animals, or processing natural resources and raw materials.⁹⁸ There is no reason to think that fish farming would not be included among these assets, and a villa owner could easily sell fish from his pond or trade them with neighbors. Certainly, if a farmer could fish enough to include fish as a cash crop, a villa owner could produce enough farmed fish, especially if he owned a large seaside *piscina*, to sell them on the market and make a profit.

Once the fish are sent to market, who bought the fish is unknown. Most ancient authors comment only on pricy fish purchased by the elite. Pliny, complaining about the spending of the upperclass, comments, *at nunc coco trium horum pretiis parantur et coquorum pisces*.⁹⁹ Similarly, Juvenal comments that the desire for mullet could easily empty a man's purse,¹⁰⁰ and

⁹⁶ *Epigrams* X. 30.16-20.

⁹⁷ Paul P. M. Erdkamp, “Beyond the Limits of ‘Consumer City’: A Model of the Urban and Rural Economy in the Roman World,” *Historia: Zeitschrift für Alte Geschichte* 50.H.3 (2001): 346.

⁹⁸ Erdkamp, 346-7.

⁹⁹ “But now a cook is bought for the price of three of these (horses) and fish at the price of three cooks,” IX. 31.

¹⁰⁰ *Satires* XI. 37.

Seneca puts the price of a 2kg mullet at 5,000 sesterces.¹⁰¹ However, after three large mullets were sold for a combined 30,000 sesterces, Suetonius says that Tiberius tried to regulate the price of fish on the market.¹⁰² The price of fish had risen so high that it started to become inaccessible to a great part of the population. A regulation on price suggests that it was important for fish to be available to a wider portion of the market and not regulated only to high-end buyers.

In an attempt to understand the Roman market for fish outside of what ancient literary sources describe, Gallant looks to Malaysia to provide a possible model for ancient fish trade. There, merchants buy from a large supply brought in by the fishermen. They immediately salt many of the fish so that they will last longer and can be sold in a normal market. Then, the best cuts of fish are exported as a luxury good to high-end markets. The bulk of the fish, on the other hand, is retained and sold in local markets.¹⁰³

A similar model probably took place in Roman markets. Fresh-caught fish or ones raised in *piscinae* entered the main market. Fishmongers could sort through the choicest fish and best cuts and offer them at a high price to more elite patrons. Less desirable fish, whether fresh or salted, then could be sold to common people. Pliny even mentions that different cuts of tuna cost different amounts: *vilissima ex his quae caudae proxima, quia pingui carent, probatissima quae faucibus*.¹⁰⁴ Therefore, there must have been at least some distinction in price among fish and cuts of fish in the Roman market. Surely, the overpriced fish mentioned by so many authors were probably for special fish; note that Juvenal, Seneca, and Suetonius (mentioned above) all refer to mullets. Similarly, only about six species of fish were common in fishponds, perhaps because

¹⁰¹ *Epistulae Morales* 95.42.

¹⁰² *Tiberius* 34.

¹⁰³ Gallant, 43.

¹⁰⁴ “The cheapest from these (pieces) are those next to the tail, because they lack fat, but the most esteemed are those near the throat,” *HN* IX. 48.

those were the most desirable to an upperclass palate. As mentioned above, Pliny counted 74 species of fish in the sea. At least some of them would not have been very desirable to the elite but would still be caught, even if just bycatch. As today, bycatch still may enter the market because it can still be sold and generate a profit.

VIII. Conclusions

It is true that fish were often considered a luxury good in Rome. Authors like Juvenal and Pliny record the extravagant prices paid for some varieties of fish, and *piscinae* became a symbol of superfluous wealth among upperclass villa owners. Even though specific fish or cuts were held in high regard, fish in general were certainly available more widely in Roman markets.

Fishermen were able to produce sizeable catches using the methods available in Roman times, so fish should have been readily available for the market. Although tridents have low potential productivity, the ability to target specific fish meant that fishermen could catch large individuals and thus bring in a large catch. Traps similarly only could be used to capture a few individuals at a time, but they could be set with little effort and left while a fisherman actively employed other fishing methods. While significant effort is required to bait multiple hooks, line fishing could potentially catch as many fish as the line has hooks, and nets notoriously could take in huge catches, even though the fish were probably small schooling species. The fishing methods available to the Romans were also efficient enough to possibly cause damage to fish stocks, especially if fishermen took fish from breeding stocks as Oppian describes. Evidence suggests that fishing pressure was strong enough to lead to a decrease in the size of fish, and a change in species presence may indicate that overfishing forced the preference to another fish, as

with tuna off the coast of Iberia. Furthermore, Juvenal mentions that fish had to be imported because they were overharvested from the waters near Rome.

Fishponds, on the other hand, ensured that fish could be available without the uncertainty of fishing. Indeed, some fishponds epitomized the lifestyle of the wealthy and became aquaria that encouraged elites to compete with each other. However, some seaside *piscinae* could have been used as holding tanks for fish before they were sent to market; others held live fish presumably bought from the market before they were eaten. Still others could have been used to breed fish, again removing uncertainty from the fish supply.

Given the availability of fish, it is unlikely that it all remained in high-end markets. While literary sources may only comment on the outrageous price of the absolute best fish, people living on the coasts could hardly be expected to ignore a readily available food source. Rather than supplementing a farmer's income in poor-harvest years, fishing was certainly the main activity for some communities, especially where the farmland was already of poor quality. Roman fishing was capable of producing large catches, large enough that changes may have occurred in the stocks. The presence of fishponds also suggests that access to fish was important even when a fresh catch was unreliable. Fish, therefore, certainly made up an important portion of the Roman economy and were not relegated to a simple luxury good.

Further study into this topic is warranted to create a more complete view of fish in the Roman economy. Even though I have left *garum* from my study, it may be useful in the future to compare fish consumption patterns to *garum* production. Investigation into the source of fish parts used for *garum* could provide more information on the fish supply. For example, fresh fish may have been gutted almost immediately after capture to preserve freshness, and the offal could then be saved for *garum* production. As more archaeological remains of fish become available,

the view of fish consumption in Rome will become more complete. Even though most fish remains in the past were not well documented, current excavations have been more careful in detailing such finds. Especially where fish bones are recorded in context and not all lumped together, new information about consumption patterns surely will emerge. Because this topic has not been well explored, any investigation into the role of fish in the Roman economy will greatly improve our understanding of fish as a natural resource in the Roman world.

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XI. Figures



Figure 1. Fish and Mollusks painting, Unknown origin, Pompeii. From DeCaro fig. 29.



Figure 2. Fish and Bird mosaic, House IX.2.27, Pompeii, Second Style. From DeCaro fig. 6.

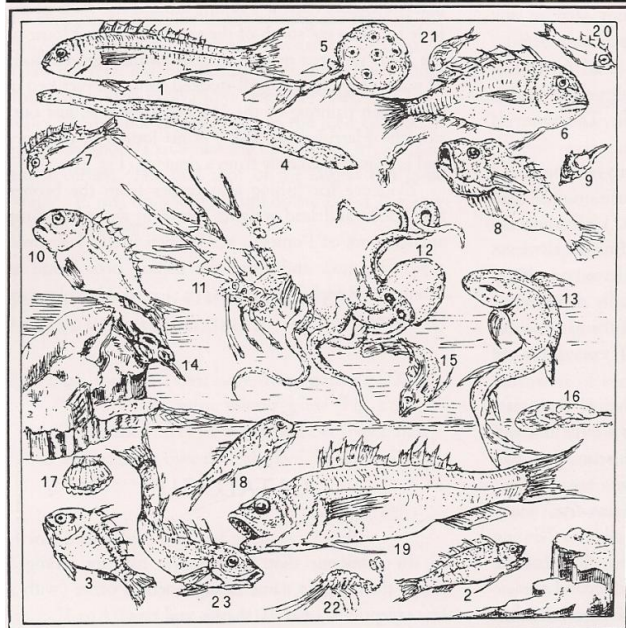


Figure 3. Octopus group mosaic and sketch with species identified, House of the Faun, Pompeii, First Style. Key to sketch: 1. *Liza aurata*; 2. *Serranus cabrilla*; 3. *Diplodus vulgaris*; 4. *Muraena helena*; 5. *Torpedo torpedo*; 6. *Sparus auratus*; 7. *Pagrus pagrus*; 8. *Scorpaena scrofa*; 9. *Murex brandaris*; 10. *Dentex dentex*; 11. *Palinurus vulgaris*; 12. *Octopus vulgaris*; 13. *Scyliorhinus stellaris*; 14. *Alcedo atthis* (bird); 15. *Trigla* sp.; 16. Penaeidae; 17. *Pecten jacobaeus*; 18. *Mullus barbatus*; 19. *Dicentrarchus labrax*; 20. *Diplodus sargus*; 21. *Diplodus annularis*; 22. *Leander* sp./*Palaemon* sp.; 23. *Trigla* sp. Modified from Reese figs. 226-7.



Figure 4. Mosaic from Sousse, Tunisia, late second century AD. This mosaic shows the wide abundance of fish and several methods of fishing. Clockwise: The top boat uses hooks and line, the right boat casts what looks to be a seine (notice that it encircles a group of small fish), the bottom boat seems to be using a different sort of hand net, and left boat is showing some type of basket trap. Modified from Blanchard-Lemee fig. 81.